TECHNICAL REPORT
PALEONTOLOGICAL RESOURCE ASSESSMENT
EAST COUNTY (ECO) SUBSTATION PROJECT
SAN DIEGO COUNTY, CALIFORNIA

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INTRODUCTION

San Diego Gas & Electric Company (SDG&E) proposes to construct a new 500/230/138 kilovolt (kV) substation (ECO Substation) in southeastern San Diego County and connect it via a new 13.3-mile-long 138 kV transmission line to a rebuilt Boulevard Substation. A short loop-in from the Southwest Power Link (SWPL) 500 kV transmission line will supply the new ECO Substation. The Proposed Project, also known as the ECO Substation Project, will be cited entirely in southeastern San Diego County within and between the unincorporated communities of Jacumba and Boulevard.

This technical report provides an assessment of issues related to paleontological resources at the proposed ECO Substation site and the existing Boulevard Substation site, as well as along the proposed SWPL loop-in 500 kV transmission line right-of-way (ROW) and the proposed ECO to Boulevard 138 kV transmission line ROW. The purpose of this report is to assist SDG&E staff in planning and design efforts for the Proposed Project as related to paleontological resource issues. Specifically, this report is intended to summarize existing paleontological resource data for the two substation sites and along the proposed transmission line ROW; assess potential impacts to paleontological resources from implementation of Proposed Project construction components; and identify avoidance and minimization measures to avoid or reduce project-related impacts wherever feasible. Additional discussion of report methodology is provided below. This report was prepared by Thomas A. Deméré and Bradford O. Riney of the Department of PaleoServices, San Diego Natural History Museum (SDNHM), San Diego, California.

PROJECT COMPONENTS

The proposed ECO Substation Project consists of the following primary components:

ECO Substation

SDG&E will acquire approximately 404 acres of land through the purchase of all or portions of six privately-owned parcels located south of Old Highway 80 and north of the United States-Mexico International Border. The actual fenced footprint of the proposed substation will only cover approximately 58 acres. Preliminary designs call for a western 230/138 kV yard and an eastern 500 kV yard. Access to the substation will be via a new roadway extending southeastward from Old Highway 80, approximately 1.2 miles southwest of its intersection with In-Ko-Pah Park Road and Interstate 8.

Topographically, the ECO Substation property lies on the southern flank of a prominent flat-topped butte (Jade Peak) that is crossed on its northwestern side by Old Highway 80. Away from Jade Peak to the south, the substation property consists of a northwestwardly sloping alluvial surface, which becomes erosionally dissected adjacent to Old Highway 80. The extreme southeastern corner of the property is characterized by more rugged canyon topography associated with the foothills of the Jacumba Mountains.

Loop-in from the SWPL

The SWPL loop-in will be constructed in the same general location as described for the new ECO Substation. A short loop to connect the existing 500 kV SWPL transmission line into the new substation will begin along the existing SWPL ROW and traverse south approximately 1,500 feet to the east side of the new substation. The existing SWPL transmission line is located immediately north of the proposed fenced footprint of the new substation and traverses the site from east to west. The SWPL loop-in ROW shares the same basic topographic setting as the ECO Substation.

New 138 kV Transmission Line

A new, approximately 13.3-mile-long, 138 kV transmission line will be constructed from the new ECO Substation to the existing Boulevard Substation located within the unincorporated community of Boulevard in southeastern San Diego County. The transmission line will be located adjacent to the existing 500 kV SWPL transmission line corridor for approximately nine miles from the ECO Substation to a point where it intersects with an existing SDG&E–owned dirt access road. At this point, the line turns north for approximately 1.5 miles. The proposed 138 kV transmission line then turns east and runs parallel to a private dirt road for approximately 0.6 mile, north for approximately 0.3 mile, and northwest for approximately 0.3 mile until it crosses over Tule Jim Lane. The transmission line then runs north along Tule Jim Lane for approximately 1.4 miles before reaching the rebuilt Boulevard Substation. The new 138 kV transmission line will require a 100-foot-wide permanent ROW and 50-foot by 50-foot temporary workspace at each pole location.

Topographically, the 138 kV transmission line ROW crosses a diverse landscape consisting of, from east to west, a low relief alluvial surface adjacent to the ECO Substation site, an eroded and weathered hilly granitic terrain roughly paralleling the north side of Carrizo Creek east of Jacumba Valley, the alluvial floor of Jacumba Valley itself, resistant volcanic slopes south of Round Mountain on the west side of Jacumba Valley, and more extensive eroded and weathered hilly granitic terrain for the run to the Boulevard Substation.

Boulevard Substation Rebuild

The Boulevard Substation is located approximately 12 miles northwest of the ECO Substation in the unincorporated community of Boulevard. Access to the site is provided by an existing asphalt-paved driveway that extends due south from Old Highway 80, approximately two miles east of its intersection with Ribbonwood Road. The rebuilt substation will be constructed approximately 63 feet to the west and 71 feet to the north of the existing substation. The rebuilt substation will be accessed by a new, 25-foot-wide asphalt-paved access road that will be approximately 190 feet in length and constructed off of Old Highway 80. Secondary access into the substation will be provided by a 210-foot-long paved spur road off of the main access road. The fenced area of the new substation will be approximately two acres (277 feet by 319 feet), allowing for the installation of new 138 kV, 69 kV, and 12 kV facilities to accommodate connection of the new 138 kV transmission line, as well as the potential for up to four generation tie-lines (gen-ties). The expansion will occur entirely on SDG&E-owned property.

Topographically, the Boulevard Substation site consists of an eroded and weathered hilly granitic terrain.

METHODOLOGY

A literature and record review was conducted of relevant published geologic reports (Brooks and Roberts, 1954; Strand, 1962; Weber, 1963; Minch and Abbott, 1973; Todd, 2004), unpublished paleontological reports (Deméré and Walsh, 1993), and unpublished museum paleontological locality data (SDNHM). All fossil localities found within a five-mile radius of the Proposed Project ROW were noted. This approach was followed in recognition of the direct relationship between paleontological resources and the geologic formations within which they are entombed. By knowing the geology of a particular area and the fossil productivity of particular formations that occur in that area, it is possible to predict where fossils will, or will not, be encountered.

As defined here, paleontological resources (i.e., fossils) are the remains and/or traces of prehistoric plant and animal life exclusive of humans. Fossil remains, such as bones, teeth, shells, leaves, and wood, are found in the geologic deposits (rock formations) within which they were originally buried. For the purposes of this report, paleontological resources can be thought of as including not only the actual fossil remains, but also the collecting localities and the geologic formations containing those localities.

A field survey of the Proposed Project ROW was conducted for this report on April 21 and July 25, 2008. Both the preferred substation site and preferred transmission line corridor were surveyed in order to field check the results of the literature and record reviews. Available outcrops within or along the two Proposed Project elements were inspected and, where relevant exposures occurred, the geology was described and fossil potential was determined.

LEVELS OF PALEONTOLOGICAL RESOURCE SENSITIVITY

The following levels of sensitivity are rated for individual formations and recognize the important relationship between fossils and the geologic formations within which they are entombed.

High Sensitivity

High sensitivity is assigned to geologic formations known to contain paleontological localities with rare, well-preserved, and/or critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleobiology and evolutionary history (phylogeny) of animal and plant groups. Generally speaking, highly sensitive formations are known to produce vertebrate fossil remains or are considered to have the potential to produce such remains.

Moderate Sensitivity
Moderate sensitivity is assigned to geologic formations known to contain paleontological localities with moderately preserved, common elsewhere, or stratigraphically long-ranging fossil material. The moderate sensitivity category is also applied to geologic formations that are judged to have a strong, but unproven potential for producing important fossil remains (e.g., Pre-Holocene sedimentary rock units representing low to moderate energy, marine to non-marine depositional settings).

Low Sensitivity
Low sensitivity is assigned to geologic formations that, based on their relative youthful age and/or high-energy depositional history, are judged unlikely to produce important fossil remains. Typically, low sensitivity formations may produce invertebrate fossil remains in low abundance.

Marginal Sensitivity
Marginal sensitivity is assigned to geologic formations that are composed either of pyroclastic volcanic rocks or metasedimentary rocks, but which nevertheless have a limited probability for producing fossil remains from certain sedimentary lithologies at localized outcrops.

Zero Sensitivity
Zero sensitivity is assigned to geologic formations that are entirely plutonic in origin and therefore have no potential for producing fossil remains.

EXISTING CONDITIONS

Regional Geological Setting

The general Proposed Project area is located within the Peninsular Range Geomorphic Province, a region primarily characterized by late Mesozoic (~120 to 85 million years old, Ma) plutonic igneous rocks of the Peninsular Ranges Batholith and early Mesozoic (~230 Ma) metasedimentary rocks of the Julian Schist and related pre-batholithic rocks. A notable exception to this general geologic setting occurs in the Jacumba Valley and Table Mountain area (Figure 1). Here a sequence of mid-Cenozoic (~18 Ma) sedimentary and volcanic rocks have been preserved in association with a series of northwest trending faults (Minch and Abbott, 1973; Todd, 2004).

The individual geologic rock units recognized at the two substation sites and along the transmission line ROW includes from youngest to oldest: Holocene valley-fill alluvium and fanglomerate, Older alluvium and fanglomerate, Jacumba Volcanics, Table Mountain Formation, Peninsular Ranges Batholith, and Julian Schist. The following section discusses each of these geologic units in terms of general geologic character, paleontology, geographic distribution, and site specific paleontological resource sensitivity.

Holocene alluvium and fanglomerate (Qya)

Introduction- Flooring Jacumba Valley are poorly consolidated stream sediments (silts, sands, and gravels) of probable late Holocene age (i.e., less than ~5,000 years old). In general, these deposits were laid down by the ephemeral streams (e.g., Carrizo Creek) which seasonally occupy these drainages. West of the Jacumba Mountains modern stream runoff is building an apron of alluvial fan deposits (fanglomerate) that extends northwestward into the headwaters of Carrizo Creek and Boulder Creek. These deposits consist of poorly consolidated silts, sands, and gravels. Todd (2004) maps these deposits as "Young alluvium (Holocene)" (Qya). URS (2008) mapped these deposits as "Alluvium."

Paleontology- No fossils are known from the Holocene alluvium and fanglomerate deposits in the project area. The relatively young geologic age of these deposits further suggests that no fossils will probably be found in them.

Distribution- Holocene alluvial deposits occur extensively across the floor of Jacumba Valley where it is crossed by the proposed 138 kV transmission line (e.g., SP-84 and SP-85). Contemporaneous alluvial deposits also occur in the smaller dry washes along this ROW east of Jacumba Valley (e.g., SP-87, SP-89, and SP-93). Holocene fanglomerates locally occur west of the Jacumba Mountains in the vicinity of the proposed ECO Substation site, where they overlie older alluvium and fanglomerate deposits.

Site Specific Resource Sensitivity- The Holocene alluvial and fanglomerate deposits in the project area possess a low paleontological resource sensitivity (Table 1).

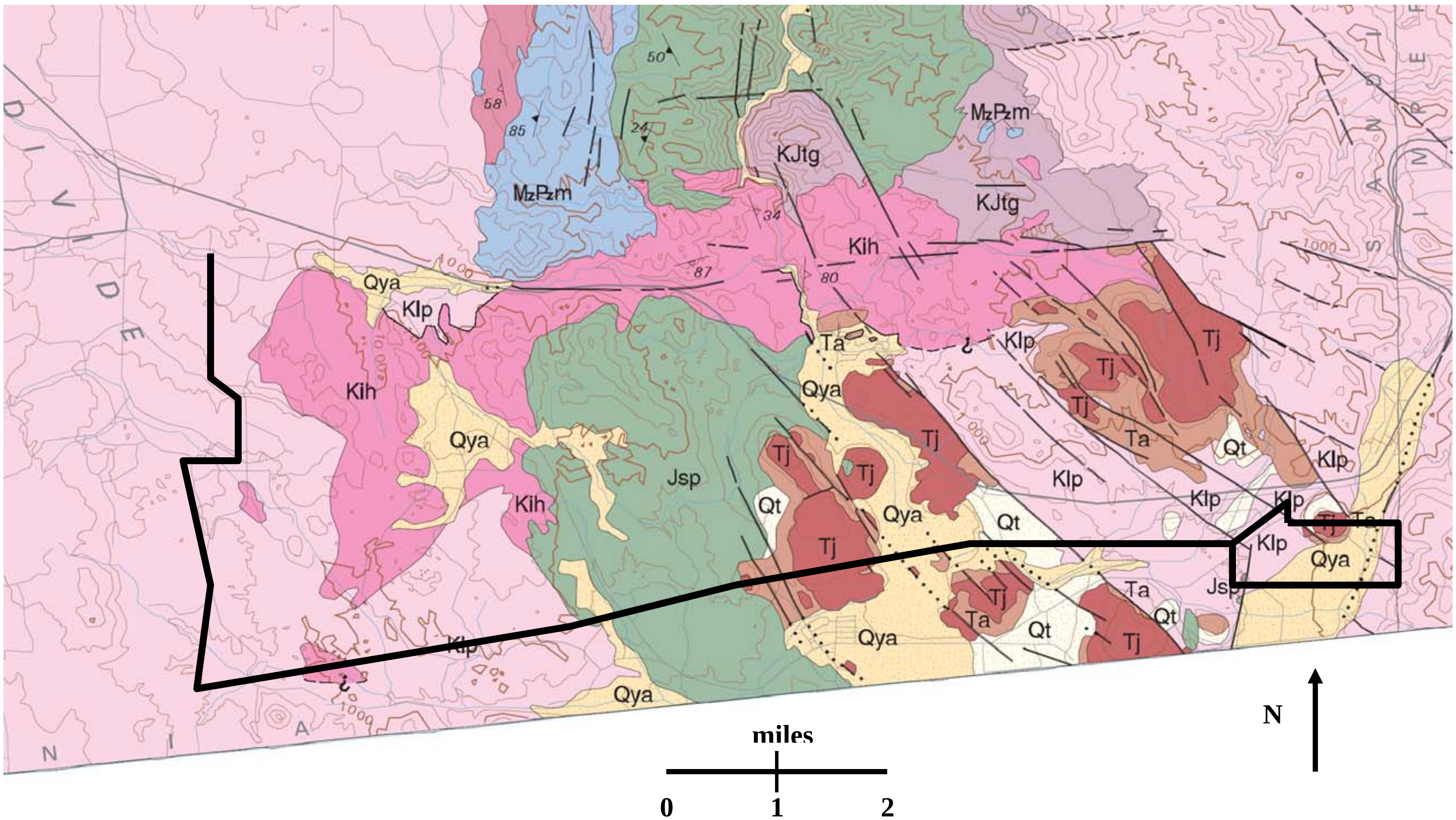

Figure 1. Portion of El Cajon, CA 30’ x 60’ geologic map of Todd (2004) showing general geology of the project area. Qya = Holocene alluvium and fanglomerate; Qt = Older alluvium and fanglomerate; Tj = Jacumba Volcanics; Ta = Table Mountain Formation; Klp, Klh, = Peninsular Range`s Batholith; Jsp = Julian Schist.

Older alluvium and fanglomerate (Qt)

Introduction- Deposits of coarse-grained, gravelly sandstones, pebble and cobble conglomerates, and claystones have been mapped as Older alluvium and fanglomerate by Minch and Abbott (1973). The exact age of these deposits is presently uncertain, but they are apparently related to late Pleistocene (10,000 to 700,000 years old) climatic events. Todd (2004) maps these deposits as "Terrace deposits (Pleistocene)" (Qt). URS (2008) mapped these deposits as "Post-lava fanglomerate" and "Older alluvium."

Paleontology- No fossil localities are recorded from these deposits in the Proposed Project area. However, fossils of Pleistocene land mammals (e.g., horse) have been collected from similar older alluvial deposits in the Warner Valley region of the Peninsular Ranges, suggesting the potential for such discoveries in the project area east of Jacumba Valley.

Distribution- As mapped by Minch and Abbott (1973) erosional remnants of older alluvial deposits have a patchy occurrence in the Proposed Project area and underlie portions of the proposed ECO Substation site, as well as areas along the proposed 138 kV transmission line. Because these authors were not closely focused on the younger sedimentary rocks of the Jacumba area, it is likely that their mapping of this rock unit is imprecise. During the field walkover, Older alluvial and fanglomerate deposits were observed in a low roadcut along Old Highway 80 in the extreme northwestern corner of the ECO Substation site. These deposits were approximately eight feet thick and consisted of dark brown friable and cross-bedded coarse-grained sandstone and angular cobble conglomerate. Similar deposits were also observed along the 138 kV transmission line both east and west of Carrizo Wash Road (e.g., SP-86, SP-88, SP-90, SP-91, SP-92, and SP-94).

Site Specific Resource Sensitivity- The general coarse-grained nature of these deposits coupled with the paucity of known fossil occurrences might suggest a low paleontological resource sensitivity. However, the fact that sparse vertebrate remains have been collected from similar deposits in Warner Valley near Lake Henshaw suggests that potentially significant sites may be encountered elsewhere, and thus a moderate resource sensitivity is here assigned (Table 1).

Jacumba Volcanics (Tj)

Introduction- The Jacumba Volcanics consist of a complex series of basaltic volcanic flows and dikes, cinder cones, ash deposits, volcanic debris flows, volcanic plugs, and breccias (Minch and Abbott, 1973). This geologic series forms a relatively thick "pile" (up to 500 feet thick) of volcanic material characterized locally by well preserved mesa-like lava flow surfaces. The formation was deposited during the early Miocene approximately 18 million years ago (Hawkins, 1970). Todd (2004) maps these deposits as "Jacumba Volcanics (Miocene)" (Tj). URS (2008) mapped these deposits as "Jacumba Volcanics."

Paleontology- No fossil localities are known from the Jacumba Volcanics and none were discovered during the field walkover. This is not surprising given their "fiery" origin (i.e., molten lava is not conducive to the preservation of remains of living organisms).

Distribution- The Jacumba Volcanics are well exposed around the margins of Jacumba Valley as well as to the northeast in the Table Mountain area. Round Mountain, for example, is a remnant basaltic plug of an extinct volcano, while the elevated mesa-like surfaces at Table Mountain represent erosional remnants of once more extensive lava flows. The summit of Jade Peak, immediately north of the ECO Substation site, is capped by a remnant of this lava flow. There are several other occurrences of the Jacumba Volcanics along the 138 kV transmission line ROW between Jacumba Peak and the western edge of Jacumba Valley (e.g., SP-78 to SP-83).

Site Specific Resource Sensitivity- The volcanic nature of the Jacumba Volcanics suggests that no fossil remains will occur in them. For this reason the entire series is here considered to possess no resource sensitivity (Table 1).

Table Mountain Formation (Ta)

Introduction- The Table Mountain Formation consists of up to 300 feet of yellowish to reddish brown, crudely stratified, friable, medium to coarse-grained sandstones and conglomeratic sandstones (Brooks and Roberts, 1954; Minch and Abbott, 1973). The age of these sedimentary rocks was thought to be late Cretaceous (i.e., ~70 Ma) by Minch and Abbott (1973). However, based on recent paleontological work by paleontologists from the SDNHM, the Table Mountain Formation is now considered to be probably early Miocene in age (i.e., >18.5 Ma and <25 Ma; S.L. Walsh, personal communication). Todd (2004) maps these deposits as "Anza Formation (Miocene)" (Ta). URS (2008) mapped these deposits as "Older sedimentary rocks."

Paleontology- Numerous paleontological collecting sites are recorded from the Table Mountain Formation as exposed at Table Mountain, in the deeply eroded hillsides between Round Mountain and Jacumba Peak, and in roadcuts along Carrizo Gorge Road on the north side of Jacumba Valley. These fossil remains were discovered in spite of the widespread coverage of local bedrock outcrops by surficial soils, slopewash, and native vegetation. Fossils recovered from the Table Mountain Formation consist of bones and teeth of land mammals, including rodents, rabbits, and camels.

Distribution- The Table Mountain Formation underlies and is protected from erosion by the overlying resistant rocks of the Jacumba Volcanics. As such, these sedimentary rocks crop out wherever the volcanic rocks occur (e.g., the deeply eroded slopes of Table Mountain and the flanking slopes of the broad lava flow-capped ridge between Round Mountain and Jacumba Peak). During the field walkover, weathered artificial exposures of the Table Mountain Formation were observed along the existing SDG&E access road in the northern half of the proposed ECO Substation site. These exposures consisted of light brown, poorly sorted, coarse-grained compact sandstones and form the lower slopes of the prominent flat-topped butte discussed earlier. The resistant cap rock of this butte is formed by one of the basalt lava flows of the Jacumba Volcanics. Additional exposures of the Table Mountain Formation were observed in the low roadcut along Old Highway

80 in the extreme northwestern corner of the ECO Substation site. The rock unit consisted of 25 feet of light brown, interbedded siltstones and fine-grained sandstones. Along the proposed 138 kV transmission line ROW, the Table Mountain Formation occurs on the flanking slopes of the broad lava flow-capped ridge between Round Mountain and Jacumba Peak.

Resource Sensitivity- Prior to 1987, no fossils were known from the Table Mountain Formation. This lack of fossils primarily was due to a lack of active field prospecting by paleontologists. Because fossils have the potential to substantially help unravel the complex geologic history of the Jacumba region, the earlier lack of fossil recovery represented a real problem for geologists working in the area. In addition, nothing was then known about the nature of the prehistoric life which lived during the period when this volcanic activity was taking place. For these reasons the discovery of even sparse fossil remains in the Table Mountain Formation is considered to be a significant event. The proven paleontological resources of the Table Mountain Formation suggests that this sedimentary rock unit possesses a high resource sensitivity (Table 1).

Peninsular Ranges Batholith

Introduction- Plutonic rocks in San Diego County comprise part of the northern end of the Peninsular Ranges Batholith that extends for several hundred miles south into Baja California, Mexico. Plutons of the Peninsular Ranges Batholith of San Diego County range in composition from granite to gabbro, and range in age from late Jurassic to late Cretaceous, approximately 90-140 Ma (Krummenacher et al. 1975; Walawender et al. 1991). These rocks formed from molten magma at a depth of several miles in the earth's crust. The emplacement of these rocks was accompanied by the alteration (metamorphosis) of the pre-existing rocks (e.g., Santiago Peak Volcanics and Julian Schist). Todd (2004) maps these deposits as "Tonalite of La Posta (early and late Cretaceous)" (Klp) and "Indian Hill granodiorite" (Klh). URS (2008) mapped these deposits as "Granitic rocks."

Paleontology- No fossils are known from these rocks.

Distribution- Plutonic igneous rocks occur throughout the Proposed Project area and primarily consist of light colored quartz diorite and granodiorite. At the ECO Substation site, exposures of these granitic rocks occur in the eroded slopes of the Jacumba Mountains. As mapped by Weber (1963), much of the 138 kV transmission line ROW (e.g., from two miles west of Jacumba Peak westward to the Boulevard Substation) is underlain by weathered exposures of plutonic igneous rocks. At the Boulevard Substation site, the entire area is underlain by deeply weathered granitic rocks (i.e., "decomposed granite"), with localized rounded blocks of more resistant plutonic rock.

Resource sensitivity- Because plutonic igneous rocks are formed by the crystallization of magmas several miles below the ground surface, these rocks are assigned a zero paleontological resource sensitivity (Table 1).

Julian Schist

Introduction- Large roof pendants of metasedimentary rock occurring within the Peninsular Ranges Batholith are the result of deformation associated with the original intrusion of Jurassic and Cretaceous magmas into older pre-existing "country rock." In the central part of San Diego County, the prebatholithic metasedimentary rocks are referred to as the Julian Schist (Donnelly, 1934; Weber, 1963), which is composed mainly of quartz-mica schist and quartzite, with minor amounts of marble and amphibolite. Todd (2004) maps these deposits as "Migmatitic schist and gneiss of Stephenson Peak (late and middle Jurassic)" (Jsp).

Paleontology- The age of the Julian Schist is uncertain. Hudson (1922) discussed the discovery of a possible Triassic ammonite in quartzites of the Julian Schist about one mile southeast of Banner. Since the whereabouts of this fossil and its exact collecting locality are unknown, the evidence it provides for the age of the Julian Schist is weak. Triassic fossils have been collected from prebatholithic metasedimentary rocks (Bedford Canyon Formation) of the central Peninsular Ranges in Riverside County, and Ordovician fossils have been collected from metasedimentary rocks located about 25 miles south of Tecate in Baja California, Mexico (Gastil and Miller, 1984). Thus, it is possible that fossils will eventually be discovered in the metasedimentary rocks in the central part of the Peninsular Ranges in San Diego County.

Distribution- Roof pendants of prebatholithic metasedimentary rocks occur in a broad, approximately two-mile-wide band west of Jacumba Peak (Weber, 1963; Minch and Abbott, 1973; Todd, 2004) along the proposed 138 kV transmission line ROW west of Jacumba Peak (e.g., SP-59 to SP-74).

Resource sensitivity- The majority of the metasedimentary rocks of the central and eastern Peninsular Ranges in San Diego County have a zero paleontological resource sensitivity (including that portion crossed by the 138 kV transmission line). However, a small proportion of these rocks, in localized areas, can be assigned a low paleontological resource sensitivity based upon the fossil discoveries discussed above. As a whole, the prebatholithic metasedimentary rocks of San Diego County can be assigned a marginal resource sensitivity (Table 1).

Table 1. Paleontological Sensitivity of Geologic Rock Units Occurring Within the Proposed Project Area

Geologic Rock Unit	Symbol	Geologic Age	Paleontological Sensitivity
ECO Substation and SWPL Loop-In			
Holocene alluvium and fanglomerate	Qya	Holocene	Low
Older alluvium and fanglomerate	Qt	Pleistocene	Moderate
Jacumba Volcanics	Tj	Miocene	Zero
Table Mountain Formation	Ta	Miocene	High
Peninsular Ranges Batholith	Klp	Cretaceous	Zero
138 kV Transmission Line			
Holocene alluvium	Qya	Holocene	Low
Older alluvium and fanglomerate	Qt	Pleistocene	Moderate
Jacumba Volcanics	Tj	Miocene	Zero
Table Mountain Formation	Ta	Miocene	High
Peninsular Ranges Batholith	Klp, Klh	Cretaceous	Zero
Julian Schist	Jsp	Triassic?	Zero
Boulevard Substation Rebuild			
Holocene alluvium	Qya	Holocene	Low
Peninsular Ranges Batholith	Klp	Cretaceous	Zero

IMPACT ANALYSIS

Direct impacts to paleontological resources occur when earthwork activities, such as mass grading operations, utility trenching excavations, or bore-pit excavations, cut into the geological deposits (formations) within which fossils are buried. These direct impacts are in the form of physical destruction of fossil remains. Since fossils are the remains of prehistoric animal and plant life, they are considered to be non-renewable. Such impacts can be significant and, under CEQA Guidelines, require mitigation.

Impacts to paleontological resources are rated in this report from high to zero depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

High significance
Impacts to high sensitivity formations (Table Mountain Formation).

Moderate significance
Impacts to moderate sensitivity formations (Older alluvium and fanglomerate).

Low significance
Impacts to low sensitivity formations (Holocene alluvium and fanglomerate).

Marginal significance
Impacts to marginal sensitivity formations.

Zero significance
Impacts to zero sensitivity formations (Peninsular Ranges Batholith and Julian Schist).

Site Specific Impacts

Impacts of potentially high to moderate significance are discussed below by rock unit and Proposed Project component.

ECO Substation
Conceptual construction plans for the ECO Substation indicate extensive excavations for two sheet pads: a western pad to house the 230/138 kV equipment yard and an eastern pad to house the 500 kV equipment yard. Because of the general westerly slope of the ground surface at the proposed ECO Substation site, the two sheet pad excavations will each involve a cut-fill transition where the eastern portion of the pad is cut to produce fill material to build the western portion of the pad. The plans suggest a maximum cut depth of approximately 35 feet for the 230/138 kV equipment yard and approximately 65 feet deep for the 500 kV equipment yard. If correct, this level of excavation will result in significant impacts to the Older alluvium and fanglomerate deposits in this area. Likewise, these deep pad excavations will also result in extensive impacts to the Table Mountain Formation. Without knowing the true thickness of the overlying Older alluvium and fanglomerate deposits it is currently not possible to determine the exact volume of Table Mountain Formation that will be impacted by these excavations. However, given the extent of the proposed sheet pad excavations, it is clear that significant impacts to the Table Mountain Formation will occur. Because of the cut-fill transition nature of the proposed sheet pad excavations, the greatest impacts will occur in the eastern (i.e., cut) portions of each pad.

SWPL Loop-In
Construction of the loop-in segment from the SWPL 500 kV transmission line to the ECO Substation will involve installation of four new transmission towers, each with four drilled concrete piers. Pier construction will require a truck-mounted auger to excavate holes measuring three to five feet in diameter and 10 to 15 feet deep, depending on soil conditions. It is here proposed that each pier borehole has the potential to create significant impacts to the Older alluvium and fanglomerate deposits in this area. Depending on the thickness of these Pleistocene-age deposits, the older Miocene-age Table Mountain Formation may also be impacted by the pier boreholes.

New 138 kV Transmission Line
Construction of the 13.3-mile-long 138 kV transmission line will involve installation of approximately 98 direct-bury steel poles. Each pole will require the excavation of holes approximately six feet in diameter and approximately 13 to 20 feet deep, depending on the type and height of the pole. In addition, installation of dead-end poles, a type of

angle pole, will be on drilled pier foundations that will require the excavation of holes approximately seven to eight feet in diameter by approximately 20 to 30 feet deep, depending on the type and height of the pole. Construction of the section of the proposed 138 kV transmission line between Jacumba Valley and Jacumba Peak (approximately steel pole [SP]-68 to SP-82, but excluding SP-77 and SP-78) and between Jacumba Valley and the ECO Substation (approximately SP-93 to SP-103) may result in significant impacts to paleontological resources preserved in the Table Mountain Formation. Because the area from SP-68 west to the Boulevard Substation is underlain by geologic deposits with zero paleontological resource sensitivity, construction activities along this portion of the ROW will not result in any significant impacts.

Boulevard Substation Rebuild
Rebuild of the Boulevard Substation will not require any deep excavations or boreholes and will not impact sensitive paleontological resources.

AVOIDANCE AND MINIMIZATION MEASURES

It is recommended that the following avoidance and minimization measures be implemented to reduce potential negative impacts on paleontological resources to below the level of significance:

PR-1. Prior to the start of construction, a qualified paleontologist should be at the initial preconstruction meeting to consult with grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. A qualified paleontologist is defined as an individual with a M.S. or Ph.D. in paleontology or geology who is experienced with paleontological procedures and techniques, who is knowledgeable in the geology and paleontology of southern California, and who has worked as a paleontological mitigation project supervisor in the region for at least one year.

PR-2. ECO Substation Site. A paleontological monitor should work under the direction of the qualified Project paleontologist and should be on site to observe excavation operations that involve the original cutting of previously undisturbed deposits with high paleontological resource sensitivity (i.e., Table Mountain Formation). A paleontological monitor is defined as an individual who has experience in the collection and salvage of fossil materials. Because the Miocene-age Table Mountain Formation is locally covered by Pleistocene-age Older alluvium and fanglomerate deposits of unknown thickness, careful monitoring of excavations of the younger deposits should be necessary to ensure that overall monitoring of the Table Mountain Formation is as complete as possible. However, if site-specific geotechnical studies are sufficient to distinguish the geologic contact between the Pleistocene and Miocene sedimentary rock units, this information can be used to more clearly define those portions of the excavations solely sited in the Table Mountain Formation. If this level of detail is achieved prior to excavating activities, a paleontological monitor should need to be on site only on a part-time basis to observe excavation operations that involve the original cutting of previously undisturbed deposits of moderate paleontological resource sensitivity (i.e., older alluvium and fanglomerates deposits).

PR-3. SWPL Loop-In. A paleontological monitor should be on-site on a full-time basis to observe borehole excavation operations that involve the original cutting of previously undisturbed deposits of high paleontological resource sensitivity (i.e., Table Mountain Formation). The mitigation caveats discussed in PR-2 apply to potential impacts from construction of the SWPL loop-in portion of the Proposed Project.

PR-3. 138 kV Transmission Line. A paleontological monitor should be on-site on a full-time basis to observe borehole excavation operations that involve the original cutting of previously undisturbed deposits of high paleontological resource sensitivity (i.e., Table Mountain Formation). These would likely occur along only two segments of the proposed ROW between approximately SP-68 and SP-82 (but excluding SP-77 and SP-78) and SP-93 and SP-103. The mitigation caveats discussed in PR-2 apply to potential impacts from construction of the 138 kV transmission line portion of the Proposed Project.

PR-4. In the event that fossils are encountered, the Project paleontologist would have the authority to divert or temporarily halt construction activities in the area of discovery to allow recovery of fossil remains in a timely fashion. The paleontologist should contact SDG&E's Cultural Resource Specialist and Environmental Project Manager at the time of discovery. The paleontologist, in consultation with SDG&E's Cultural Resource Specialist, would determine the significance of the discovered resources. SDG&E's Cultural Resource Specialist and Environmental Project Manager must concur with the evaluation procedures to be performed before construction activities are allowed to resume. Because of the potential for recovery of small fossil remains, it may be necessary to set up a screen-washing operation on site. When fossils are discovered, the paleontologist (or paleontological monitor) would recover them along with pertinent stratigraphic data. In most cases, this fossil salvage can be completed in a short period of time. Because of the potential for recovery of small fossil remains, such as isolated mammal teeth, recovery of bulk-sedimentary-matrix samples for off-site wet screening from specific strata may be necessary, as determined in the field. Fossil remains collected during monitoring and salvage would be cleaned, repaired, sorted, cataloged, and deposited in a scientific institution with permanent paleontological collections.

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