PALEONTOLOGICAL RESOURCE ASSESSMENT
MELROSE HEIGHTS PROJECT
CITY OF OCEANSIDE
SAN DIEGO COUNTY, CALIFORNIA

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INTRODUCTION

The Melrose Heights project is a proposed residential development located northeast and northwest of the intersection of Oceanside Boulevard and Melrose Drive, in the City of Oceanside, California (Figures 1 and 2). The project site consists of three separate Planning Areas (PA), including PA-1, PA-2, and PA-3, in addition to an open space parcel (Figure 3). The project site is located north of the North County Transit District's Melrose Drive Sprinter Station and west of the Vista Sports Park and id bisected by a portion of Melrose Drive.

This technical report provides an assessment of issues related to paleontological resources within the project site. The purpose of this report is to assist in planning and design efforts for the purposed project as related to paleontological resource issues. Specifically, this report is intended to summarize existing paleontological resource data in the project site and vicinity; assess potential impacts to paleontological resources from construction of the project; and identify mitigation measures to avoid or reduce project-related impacts wherever feasible. Additional discussion of report methodology is provided below. This report was prepared by Sarah A. Siren and Thomas A. Demeré of the Department of PaleoServices, San Diego Natural History Museum (SDNHM), San Diego, California.

Paleontological Resources

As defined here, paleontological resources (i.e., fossils) are the buried remains and/or traces of prehistoric organisms (i.e., animals, plants, and microbes). Body fossils such as bones, teeth, shells, leaves, and wood, as well as trace fossils such as tracks, trails, burrows, and footprints, are found in the geological deposits (formations) within which they were originally buried. The primary factor determining whether an object is a fossil or not, isn't how the organic remain or trace is preserved (e.g., "petrified"), but rather how old is the organic remain or trace. Although typically it is assumed that fossils must be older than ~10,000 years (i.e., the generally accepted end of the last glacial period of the Pleistocene Epoch), organic remains of early Holocene age can also be considered to represent fossils because they are part of the record of past life.

Fossils are considered important scientific and educational resources because they serve as direct and indirect evidence of prehistoric life and are used to understand the history of life on Earth, the nature of past environments and climates, the membership and structure of ancient ecosystems, and the pattern and process of organic evolution and extinction. In addition, fossils are considered to be non-renewable resources because typically the organisms they represent no longer exist. Thus, once destroyed, a particular fossil can never be replaced. And finally, for the purposes of this report, paleontological resources can be thought of as including not only the actual fossil remains and traces, but also the fossil collecting localities and the geological formations containing those localities.

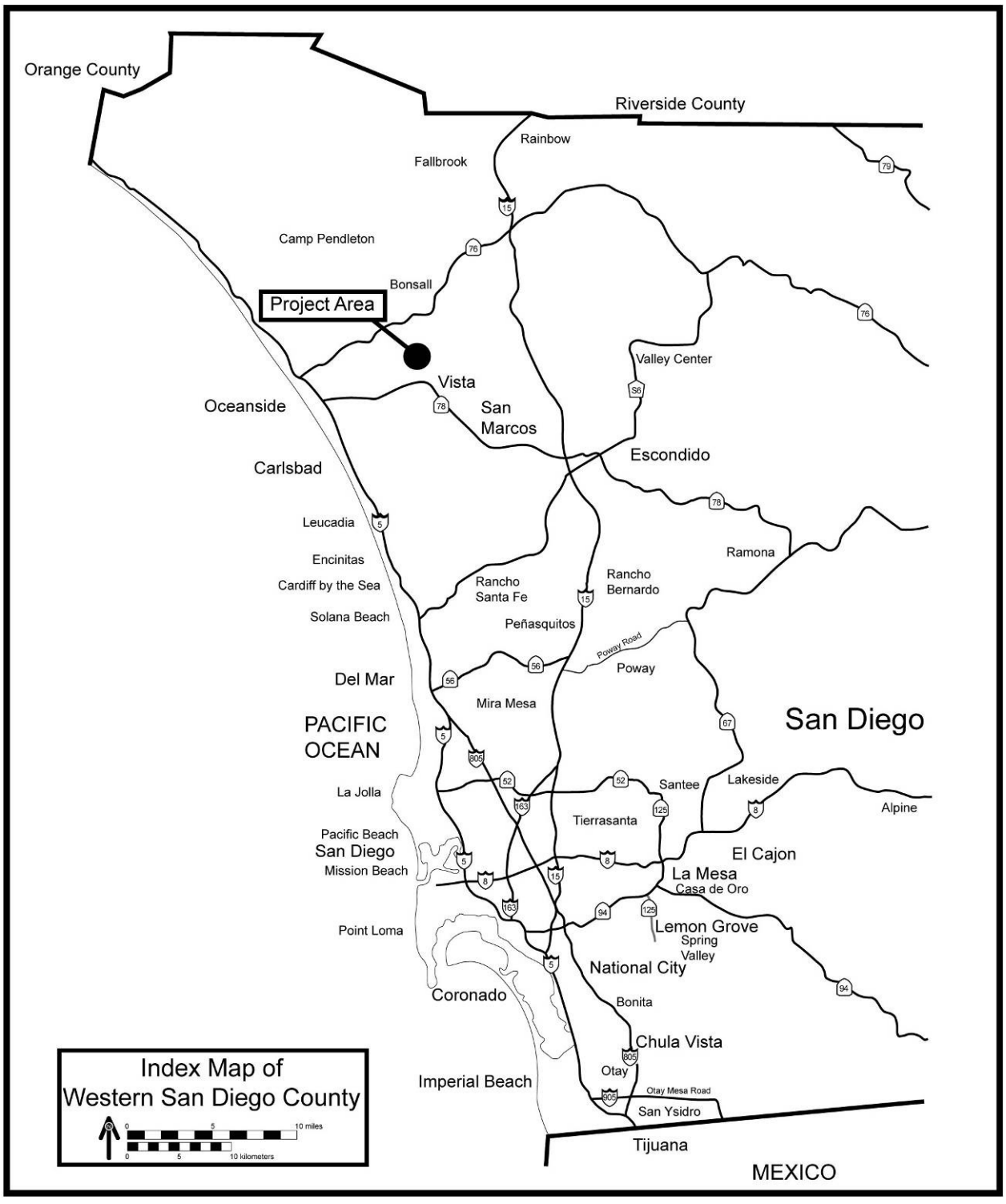

Figure 1. Index map of western San Diego County showing the general location of the Melrose Heights project site.

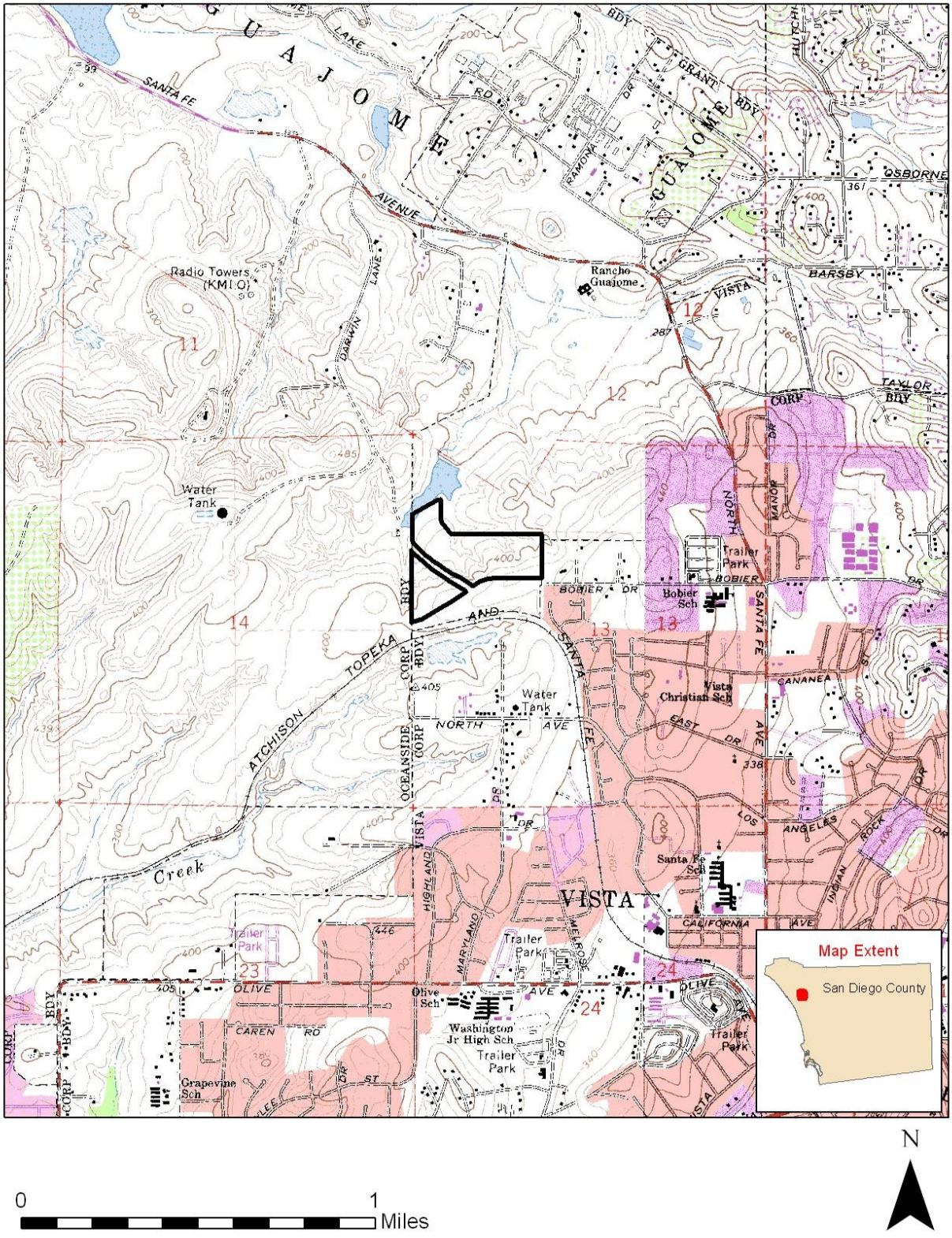

Figure 2. Topographic map of the Melrose Heights project site in the City of Oceanside, California. Base Map: portions of the San Luis Rey and San Marcos, CA 7.5' topographic quadrangles.

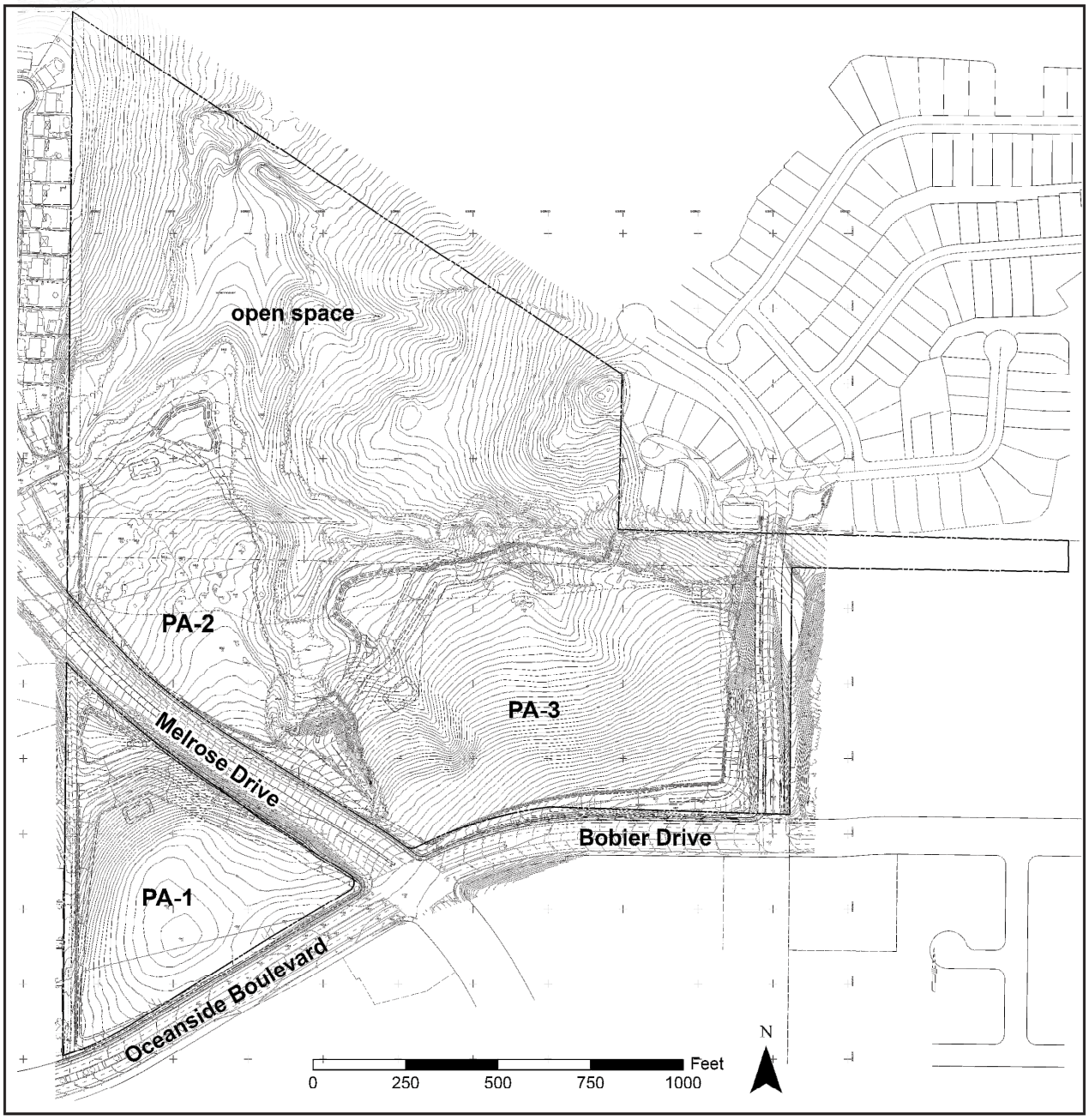

Figure 3. Conceptual grading plan of the Melrose Heights project site showing planning areas PA-1, PA-2, and PA-3, Oceanside, CA.

METHODOLOGY

A review was conducted of relevant published and unpublished geologic reports (Wilson, 1972; Tan and Kennedy, 1996; Kennedy and Tan, 2005), unpublished paleontological reports (Deméré and Walsh, 1993), and museum paleontological locality data (SDNHM, Department of Paleontology; see attached Records Search in the Appendix). This approach was followed in recognition of the direct relationship between paleontological resources and the geologic formations within which they are entombed. Knowing the geology of a particular area and the fossil productivity of formations that occur in that area, it is possible to predict where fossils will, or will not, be encountered.

A pedestrian survey of the project area and immediately surrounding areas was conducted on June 25, 2012 by SDNHM personnel to field check the results of the literature and record searches and to determine the paleontological resource sensitivity of the geologic units that will be affected by the proposed improvements.

EXISTING CONDITIONS

PHYSICAL GEOLOGICAL SETTING

The geology of the project area is relatively complex as described in the geotechnical report by Geocon, Inc. (2012) and depicted on the published geologic maps of Tan and Kennedy (1996) and Kennedy and Tan (2005). The majority of the PA-1, west of Melrose Drive, is underlain by artificial fill to varying depths. These relatively youthful deposits overlie older geologic deposits mapped as Eocene-age sedimentary rocks of the Santiago Formation (Figure 4). In the larger, eastern portion of the project site, east of Melrose Drive, artificial fill is mapped within PA-2 adjacent to Melrose Drive and at the eastern border of the project site, along Sports Park Way (Geocon, Inc., 2012). In both PA-2 and PA-3 weathered plutonic igneous rocks mapped as the Cretaceous-age Bonsall Tonalite are directly overlain by sedimentary rocks of the Eocene-age Santiago Formation, The remainder of the deposits east of Melrose Drive include: Quaternary terrace deposits, Eocene Santiago Formation, and Cretaceous Bonsall Tonalite (Geocon, Inc., 2012; Kennedy and Tan, 2005), as confirmed during the pedestrian survey and presumably underlie the unmapped topsoil and mapped artificial fill materials on site. The Santiago Formation was visible in a roadcut on the south side of Oceanside Boulevard, and documented at shallow depths (<4 feet in Trench T-12; Geocon, Inc., 2012) in the southern portion of PA-3. Older crystalline bedrock underlying the eastern portion of the project site is mapped as Cretaceous-age plutonic rocks of the Peninsular Ranges Batholith (Tan and Kennedy, 1996), and was evident from the boulders encountered onsite.

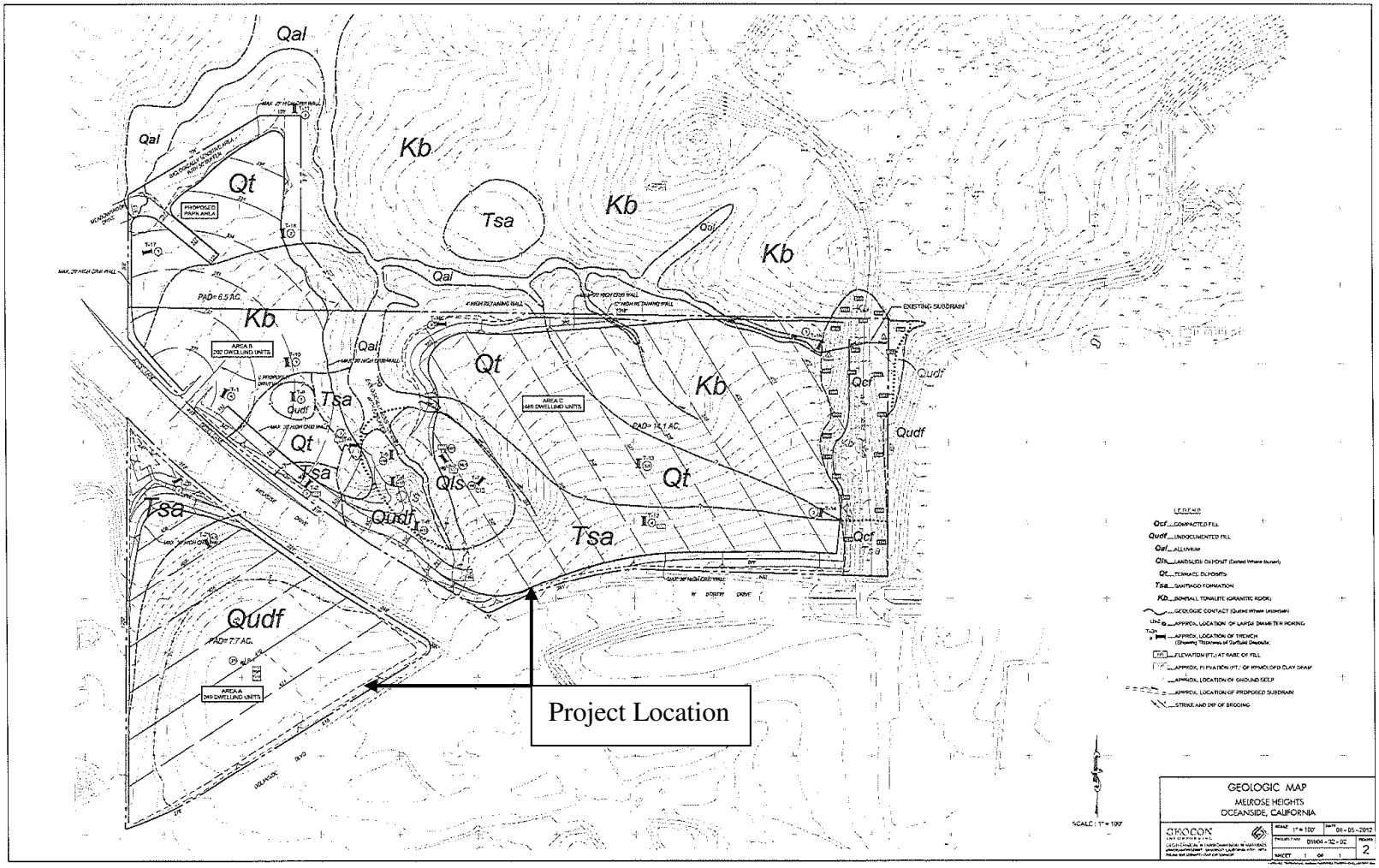

Figure 4. Geology, as mapped by Geocon, Inc. (2012), in eastern Oceanside, San Diego County, California. The Melrose Heights property is underlain by modern artificial fill (Qcf and Qudf), Quaternary alluvium (Qal), landslide deposits (Qls), Quaternary Terrace deposits (Qt), Santiago Formation (Tsa), and Cretaceous Bonsall Tonalite (Kb) as mapped north of Oceanside Boulevard.

PALEONTOLOGICAL RESOURCE ASSESSMENT

The following section provides a general overview of the types of geologic deposits located within the project area.

Modern Artificial Fill Materials (Qcf and Qudf)

Introduction: Artificial fill materials blanket the majority of PA-1, and the south-central and eastern-most portions of PA-2 and PA-3. These fill materials presumably were derived from earlier construction activities and were placed in such a way as to provide topographically high areas for current and future development. The thickness of these "loose/soft" fill materials is variable, with a maximum thickness of 21 feet in PA-1 (Geocon, Inc., 2012).

Paleontology: No fossils of paleontological interest are located in artificial fill materials. Any contained organic remains have lost their original stratigraphic/geologic context due to the disturbed nature of the artificial fill materials.

Site Specific Assessment: Artificial fill materials are assigned a zero paleontological resource sensitivity due to the loss of the stratigraphic/geologic context of any contained organic remains (e.g., fossils).

Quaternary Alluvial Deposits (Qal)

Introduction: Quaternary alluvial deposits occur in the floor of the small drainage that separates PA-2 from PA-3 in the area east of Melrose Drive. Site-specific geotechnical investigations indicate that these alluvial deposits consist of "relatively soft/loose, sandy clays to silty sands (Geocon, Inc., 2012).

Paleontology: Fossils are generally unknown from the younger alluvial deposits in the Coastal Plain of San Diego County. One relevant exception is a mammoth femur that was purportedly recovered from Quaternary alluvial deposits in the Santa Margarita River channel at the south end of Marine Corps Base Camp Pendleton. No fossils are reported from the younger alluvial deposits that occur within the project site.

Site Specific Assessment: Younger alluvial deposits occur within the modern drainages associated with the San Luis Rey River to the north. Based on its post-Pleistocene age, younger alluvium is assigned a low paleontological resource sensitivity.

Quaternary Terrace Deposits (Qt)

Introduction: Within the project area, terrace deposits occur east of Melrose Drive, beneath the future Park Site and in PA-2 and PA-3, east and west of the small drainage that bisects the two planning areas (Geocon, Inc., 2012). These deposits have the potential to be Pleistocene in age (greater than 10,000 years old, but less than ~500,000 years old) and presumably were derived from local streams draining from the mountains to the north and east. In composition, these deposits consist of "reddish to yellowish brown, clayey sand to sandy clay" (Geocon, Inc., 2012). The terrace deposits are locally capped by Holocene alluvium and at depth, rest on Eocene and older Cretaceous igneous rocks (Geocon, Inc., 2012; Kennedy and Tan, 2005).

Paleontology: The record search failed to report any previously recorded paleontological sites within the project site. However, there is one fossil locality that was discovered within these same age deposits less than a mile north of the project site at the North Coast Church in Vista (see Appendix). A mammoth molar tooth was discovered during construction-related excavation activities at this location. A second documented fossil locality discovered in Quaternary terrace deposits occurs approximately two miles to the west of the project site and produced skeletal remains of horse and bison.

Scientifically significant paleontological resources have been recovered from correlative terrace deposits in other areas of northern San Diego County and include fossil plants, invertebrates (terrestrial and freshwater snails), and mammals (ground sloth, rodents, horse, tapir, camel, deer, llama, mastodon, and mammoth) (Deméré and Walsh, 1993).

Site Specific Assessment: Although there are no previous records of fossil localities occurring in the terrace deposits within the project site, there are recorded paleontological collecting sites in correlative deposits as exposed within a two mile radius. Because of these previous records, and following the paleontological guidelines developed by the County of San Diego, these terrace deposits are assigned a high paleontological resource sensitivity rating.

Eocene Santiago Formation (Tsa)

Introduction: Eocene-age sedimentary rocks of the Santiago Formation occur in all three planning areas (PA-1, PA-2, and PA-3) of the project site as discussed in the geotechnical report (Geocon, Inc., 2012). The Santiago Formation was named by Woodring and Popenoe (1945) for a sequence of Eocene strata exposed in the Santa Ana Mountains of Orange County. The Eocene strata of northwestern San Diego County have generally been assigned to the Santiago Formation (Wilson, 1972) rather than to the La Jolla or Poway groups of southwestern San Diego County because the sequence of distinctive conglomerates that serves to divide and define formations of these latter groups does not occur in northwestern San Diego County. As recognized here, the Santiago Formation is broadly correlative with almost the entire middle Eocene stratigraphic sequence exposed to the south in the metropolitan San Diego area (Ardath Shale through Pomerado Conglomerate), approximately 40-49 Ma. Wilson (1972) recognized three members of the Santiago Formation in the Encinitas-Carlsbad area, referring to them as members "A", "B", and "C" in ascending order. Member "C" is composed predominantly of fine- to very coarse-grained, white to gray-white, friable, cross-bedded, arkosic sandstone with interbeds of green to green-brown siltstone, silty mudstone, and claystone" (Wilson, 1972). Member "B" consists largely of green and gray, very fine- to medium-grained, arkosic sandstone, with common calcite-cemented concretions and frequent interbeds of multicolored clayey sandstone and claystone (Wilson, 1972). Member "A" generally consists of green, unfossiliferous, massive mudstone (Wilson, 1972). The Eocene sedimentary rocks exposed in the nearby project sites (e.g., Panorama Ridge and Gordon Property) have fossil localities assigned to Member “B” of the Santiago Formation based the geologic mapping of Wilson (1972).

Paleontology: Fossils locally occur in Member “B” deposits of the Santiago Formation exposed in the Carlsbad, Oceanside, and Vista area and consist of well-preserved shells and tests of estuarine and nearshore marine invertebrates (e.g., clams, oysters, snails, crabs, and sea urchins),

as well as rare skeletal remains aquatic vertebrates (sharks, rays, and bony fish). In Oceanside, Member "B" sandstones have also produced rare, but significant, skeletal remains of terrestrial mammals (Walsh, 1996). These fossil records are noteworthy and serve to document the location and faunal composition of Eocene paleoenvironments in northern San Diego County. Fossil discoveries in member "B" strata of the Santiago Formation are documented within one mile of the project site and produced fossil remains of marine bivalve mollusks (e.g., Arcidae, Veneridae, Pelecyopoda; see Appendix). Additional fossil localities have been discovered in marine sandstones of the Santiago Formation as exposed to the northwest of the project site. These localities also produced fossils of marine invertebrates, but also yielded remains of marine vertebrates, including shark teeth (see Appendix).

Site Specific Assessment: Topsoil, varing in thickness from one to 4.5 feet, overlies the majority of the project site and (Geocon, Inc., 2012) and prevented direct observation of the underlying Santiago Formation. During the pedestrian survey, good exposures of the Santiago Formation were observed along the south side of Oceanside Boulevard, immediately to the south of the project site, due east of the intersection of Melrose Drive and Oceanside Boulevard (Figure 5). Exposed in the outcrop was a basal five foot section of light gray, poorly sorted, fine to coarse grained sandstone with the top of the section obscured by overburden.

Although there are no previous records of fossil localities occurring in the Santiago Formation within the project site, there are five recorded paleontological collecting sites in correlative deposits as exposed less than one mile northwest (Panorama Ridge) and southeast (Gordon Property) of the project site (see Appendix). The majority of these sites were discovered and collected during paleontological monitoring of mass grading operations for residential and municipal construction projects. Because of these previous records, and following the paleontological guidelines developed by the County of San Diego, Member "B" of the Santiago Formation is assigned a high paleontological resource sensitivity rating. There is potential for both members A and B to be encountered during grading of the project site.

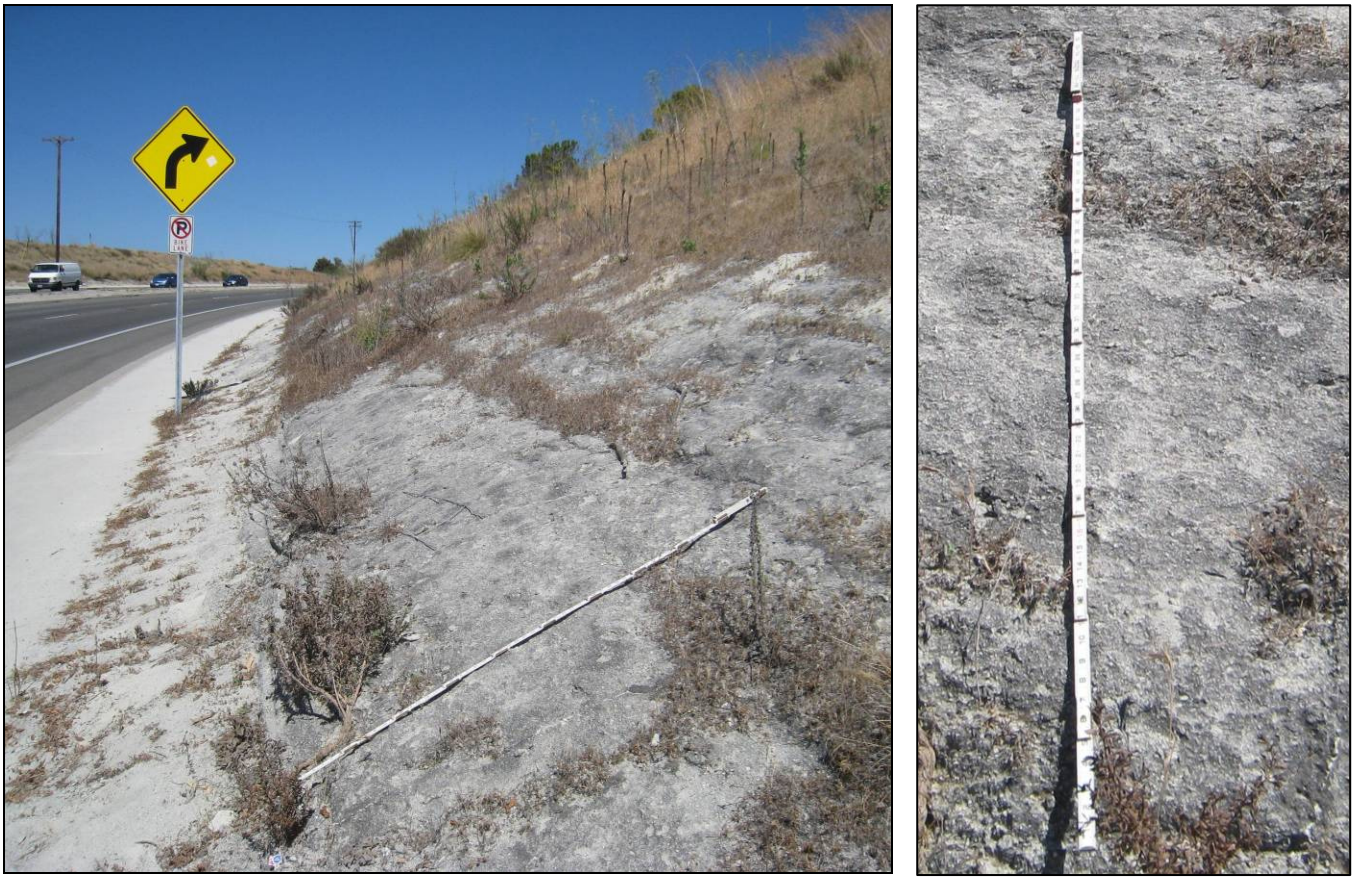

Figure 5. Outcrop of Santiago Formation located on the south side of Oceanside Boulevard, east of the intersection with Melrose Drive, and opposite PA-3 in the eastern portion of the Melrose Heights project site.

Cretaceous Bonsall Tonalite (Kb)

Introduction: Plutonic igneous bedrock units exposed within the PA-2 and PA-3of the project site have been mapped as the Bonsall Tonalite (Geocon, 2012; Kennedy and Tan, 2005; Tan and Kennedy, 1996). These plutonic rocks are part of the Peninsular Ranges Batholith, which extends for several hundred miles south into Baja California, Mexico. Individual plutons of the Peninsular Ranges Batholith in San Diego County range in composition from granite to gabbro, and range in age from early Jurassic to late Cretaceous, approximately 125 to 90 Ma (Krummenacher et al., 1975; Walawender et al., 1991). These rocks were formed directly from magma at a depth of several miles within the earth's crust.

Paleontology: Plutonic igneous rocks do not contain fossils because they directly formed from magma within the earth's crust at high pressures and high temperatures. These rocks were later uplifted and eroded to their present condition. Because they contain no fossils, plutonic rocks have no paleontological sensitivity (zero sensitivity; Deméré and Walsh, 1993).

Site Specific Assessment: Bedrock units with zero potential to yield paleontological resources are mapped in the eastern portion of the project site, specifically west of the Vista Sports Park in

PA-3 and southeast of the intersection between Meadowbrook Drive and Melrose Drive in PA-2 (Geocon, 2012; Kennedy and Tan, 2005; Figure 6). In addition, these bedrock units underlie the younger sedimentary sequence of Santiago Formation, Quaternary terrace deposits, and surficial veneer of younger alluvium and artificial fill.

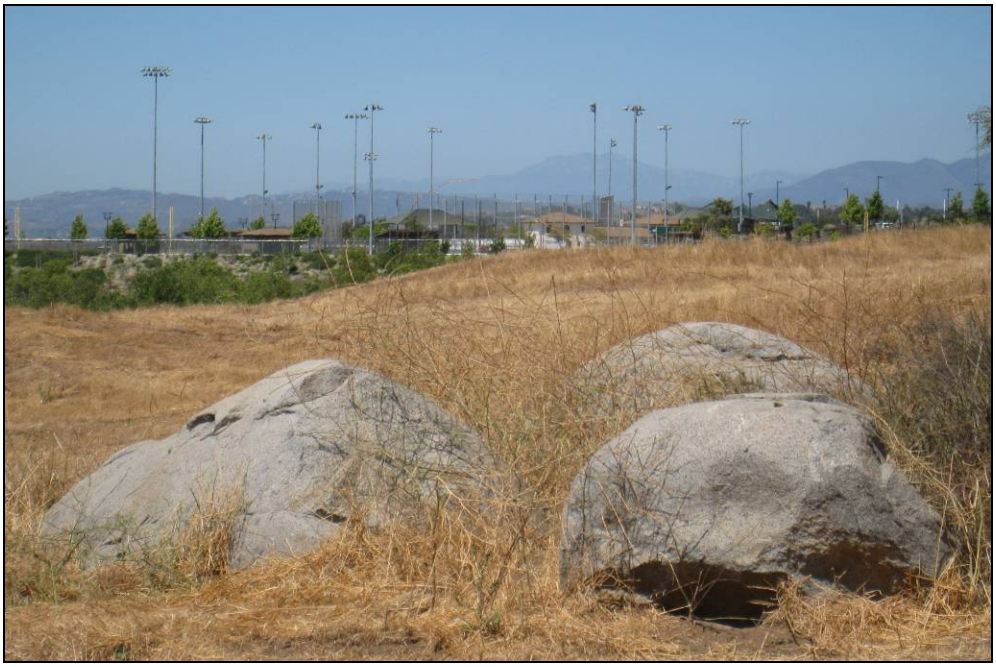

Figure 6. Boulders of Bonsall Tonalite east of Melrose Drive in PA-2 with Vista Sports Park visible in the background to the east.

IMPACT ANALYSIS

INTRODUCTION

Direct impacts to paleontological resources occur when earthwork activities, such as mass grading operations, 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 nonrenewable. Such impacts can be significant and, under CEQA guidelines, require mitigation.

Impacts to paleontological resources are typically rated from high to zero depending upon the resource sensitivity of impacted formations.

High significance

Impacts to high sensitivity formations (Quaternary Terrace Deposits and Santiago Formation).

Moderate significance

Impacts to moderate sensitivity formations (none within the project site).

Low significance

Impacts to low sensitivity formations (Quaternary Alluvium).

Zero significance

Impacts to formations with no fossil potential (Bonsall Tonalite and artificial fill).

SITE SPECIFIC IMPACTS

Preliminary plans for the Melrose Heights project site propose excavations for building foundations and utilities. Any excavations into the potentially fossil-bearing strata within the Quaternary terrace deposits and/or Santiago Formation should be mitigated. These potential negative impacts to paleontological resources can be reduced to below the level of significance through implementation of a paleontological mitigation plan as outlined below.

MITIGATION MEASURES

1. A qualified paleontologist should attend the pre-construction meeting to consult with the grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. (A qualified paleontologist is defined as an individual with a MS or Ph.D. in paleontology or geology that is familiar with paleontological procedures and techniques, who is knowledgeable in the geology and paleontology of San Diego County, and who has worked as a paleontological mitigation project supervisor in the county for at least one year.)
2. A paleontological monitor should be on-site on a full-time basis during the original cutting of previously undisturbed deposits of high paleontological resource potential (Quaternary Terrace Deposits and Santiago Formation) to inspect exposures for contained fossils. (A

paleontological monitor is defined as an individual who has experience in the collection and salvage of fossil materials. The paleontological monitor should work under the direction of a qualified paleontologist.)

3. When fossils are discovered, the paleontologist (or paleontological monitor) should recover them. In most cases this fossil salvage can be completed in a short period of time. However, some fossil specimens (such as a complete large mammal skeleton) may require an extended salvage period. In these instances the paleontologist (or paleontological monitor) should be allowed to temporarily direct, divert, or halt grading to allow recovery of fossil remains in a timely manner. Because of the potential for the recovering of small fossil remains, such as isolated mammal teeth, it may be necessary to set up a screen-washing operation on the site.
4. Fossil remains collected during monitoring and salvage should be cleaned, repaired, sorted, and cataloged as part of the mitigation program.
5. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, should be deposited (as a donation) in a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum. Donation of the fossils should be accompanied by financial support for initial specimen storage.
6. A final summary report should be completed that outlines the results of the mitigation program. This report should include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of recovered fossils.

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