PALEONTOLOGICAL RESOURCE SURVEY REPORT
VALLEY VIEW PROJECT

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MANAGEMENT SUMMARY

The purpose of this study was to determine the potential effects on paleontological resources of the proposed Valley View Project (project). This study was performed in accordance with the guidelines set forth by the City of Carlsbad in compliance with the California Environmental Quality Act (CEQA). A summary of the assessment is summarized in Table 1.

The project involves construction of an approximately 11,977 square foot industrial office building on a portion of an existing 6.34-acre parcel located on the north side of Palmer Way between Cougar Drive and Impala Drive. The property is presently vacant and on the shoulder of an existing, fully improved industrial public street. Development of the proposed office building will impact an estimated 25 percent of the site, with the remaining 75 percent of the site to be preserved as natural open space. The steep slope areas will be preserved in their natural state, except for fire suppression thinning, which is a requirement of the City of Carlsbad.

The paleontologically sensitive rock units underlying the project area in the vicinity of Palmer Way are mapped as Late Cretaceous Point Loma Formation underlain by Upper Cretaceous Lusardi Formation. The field survey conducted by Red Tail paleontologists confirmed that the site has been previously graded and only previously disturbed dirt can be observed at the surface.

Per the requirements stated in the Tribal, Cultural and Paleontological Guidelines (City of Carlsbad, 2017), the record search and survey results have been reviewed by a qualified paleontologist knowledgeable about local geology and paleontology with specific expertise in the type of fossils being evaluated. Any proposed excavation activity that extends deep enough to encounter previously undisturbed deposits have the potential to adversely impact nonrenewable paleontological resources. Due to the high paleontological sensitivity of the Point Loma Formation and the moderate paleontological sensitivity of the Lusardi Formation in San Diego County (Deméré and Walsh, 1993), in addition to the numerous previously documented fossil collection localities near the project site, implementation of a complete paleontological resource mitigation program during subsurface excavation activity is recommended.

In addition, it is recommended that the plan require the adoption of a standard unanticipated discovery measure that instructs construction personnel to immediately halt ground-disturbing activity at the location of a suspected paleontological exposure plus a 50-foot radius buffer around the discovery, per City of Carlsbad guidelines, and work shall be halted within the buffer until the City can consult with a qualified paleontologist on the identification and evaluation of the find.

INTRODUCTION

This document summarizes the results of the paleontological assessment survey conducted by Red Tail Environmental (Red Tail) for Land Development LLC, in preparation of anticipated excavation activities associated with construction of the project. The purpose of this study was to determine the potential effects on paleontological resources of the proposed project. This study was performed in accordance with the guidelines set forth by the City of Carlsbad in compliance with the California Environmental Quality Act (CEQA).

Project Description

The project involves construction of an approximately 11,977 square foot industrial office building on a portion of an existing 6.34-acre parcel located on the north side of Palmer Way between Cougar Drive and Impala Drive in the City of Carlsbad, San Diego County, California (Figures 1 and 2). The property is presently vacant and on the shoulder of an existing, fully improved industrial public street. Development of the proposed office building will impact an estimated 25 percent of the site, with the remaining 75 percent of the site being preserved as natural open space. The steep slope areas will be preserved in their natural state, except for fire suppression thinning, which is a requirement of the City of Carlsbad. The two-story building includes an office floor over a parking floor that provides a total of 46 parking spaces. The plan also includes an outdoor employee eating area as well as a common patio area on the northern side of the building. All of the necessary utilities to accommodate the proposed development will also be installed as part of construction.

Project Personnel

N. Scott Rugh served as Principal Investigator for this survey and Jennifer M. DiCenzo served as the Project Manager. The survey was performed by N. Scott Rugh and Jennifer M. DiCenzo. Spencer G. Bietz and Jennifer M. DiCenzo completed the GIS report maps. This report was prepared by N. Scott Rugh and Jennifer M. DiCenzo.

REGULATORY CONTEXT

The following is a discussion of applicable laws that protect all vertebrate fossils and any unique paleontological locality.

California Environmental Quality Act Of 1970

CEQA clearly defines the state's policy to "take all action necessary to provide the people of this state with…historic environmental qualities." CEQA further states that public or private projects financed or approved by the state are subject to environmental review. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies to analyze the environmental effects of any proposed project. In the event that a project is determined to have a potentially significant environmental effect, the act requires that alternative plans and mitigation measures be considered. If paleontological resources are identified as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects.

State guidelines require that all private and public activities not specifically exempted be evaluated for the potential to adversely impact the environment, which includes impacts to paleontological resources.

Public Resources Code

Paleontological resources are limited, nonrenewable resources of scientific and educational value, which are afforded protection under state laws and regulations. This study satisfies requirements of Public Resources Code Section 5097.5, in accordance with state guidelines which state that no person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature,

situated on public lands, except with the express permission of the public agency having jurisdiction over said lands. Violation of this section is a misdemeanor. This analysis also complies with guidelines and significance criteria specified by the Society of Vertebrate Paleontology (2010).

City of Carlsbad General Plan

The City's Draft General Plan Update (2014) specifies policies to reduce impacts to paleontological resources. The Proposed Arts, History, Culture and Education Element of the Draft General Plan Update (2014) statement regarding paleontological (and archaeological) resources is summarized as follows:

- Implement the City of Carlsbad Cultural Resources Guidelines to avoid or substantially reduce impacts to paleontological (and archaeological) resources;
- During construction of specific development projects, require monitoring of grading, ground-disturbing, and other major earth-moving activities in previously undisturbed areas or in areas with known paleontological (or archaeological) resources by a qualified professional, (as well as tribal monitor, if applicable). A qualified professional (and tribal monitor, if applicable) shall observe grading, ground-disturbing, and other earth-moving activities (City of Carlsbad, 2014).

Definition and Significance of Paleontological Resources

Paleontological resources, or fossils, are the buried remains and traces of once-living organisms preserved in the geological formations within which they were originally buried. These include bones, teeth, shells, wood, leaf impressions, footprints, burrows and microscopic remains. Fossils are typically older than 10,000 years but remains of early Holocene age can also be considered to represent fossils because they represent a record of life in the past. Additionally, the localities of the fossil collections and the geological formations containing those localities are also considered paleontological resources.

Fossils are considered non-renewable resources because typically the organisms they represent no longer exist, and once destroyed can never be replaced. Fossils are important scientifically and educationally because they are evidence of prehistoric life on Earth. Paleontologists use fossils remains to better understand aspects of paleoenvironments and paleoclimates, to study patterns and processes of evolution and extinction, and to determine relationships between extinct and extant organisms. Fossil resources vary widely in their relative abundance and distribution and not all are regarded as significant. Preserved vertebrate fossils remains or track ways are classed as significant by most state and federal agencies and professional groups (and are specifically protected under the California Public Resources Code). In many cases, fossils of plants or invertebrate animals are also considered significant and can provide important information about ancient local environments.

Paleontological resources that may be considered not to have scientific significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. The full significance of fossil specimens or fossil assemblages cannot be accurately predicted before they are collected, and in many cases, before they are prepared in the laboratory and compared with previously collected fossils. Pre-construction assessment

of significance associated with an area or formation must be made based on previous finds, characteristics of the sediments, and other methods that can be used to determine depositional conditions.

The Tribal, Cultural and Paleontological Guidelines (City of Carlsbad, 2017) state that fossils are considered to be significant 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 therein;
- The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
- The fossils demonstrate unusual or spectacular circumstances in the history of life;
- 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; and/or,
- All identifiable vertebrate fossils are considered significant due to the rarity of their preservation.

Paleontological Resources Sensitivity Criteria

The following is a list of definitions for high, moderate, low, marginal, and no paleontological resource potential, or sensitivity, as set forth in the County of San Diego's Guidelines for Determining Significance (2007) with respect to paleontological resources, as required by the City of Carlsbad Tribal, Cultural and Paleontological Guidelines.

High Resource Sensitivity

High resource potential or high sensitivity are assigned to geologic formations known to contain paleontological localities with rare, well preserved, critical fossil remains for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleoclimatic, paleobiological, and phylogeny of animal and plant groups. Generally, formations with high resource sensitivity are considered to have the most potential to produce unique invertebrate fossil assemblages or unique vertebrate fossil materials.

Moderate Resource Sensitivity

Moderate resource potential or moderate sensitivity are assigned to geologic formations known to contain paleontological localities, or they are considered to have a strong, even if yet unproven locally, potential for producing unique fossils.

Low Resource Sensitivity

Low resource potential or low sensitivity are assigned to geologic formations that are considered unlikely to produce unique fossil remains based on their relatively young age and high-energy depositional history. However, when fossils are found in these formations, they are often very significant additions to our understanding of the geologic history of this region. Occasionally, deeper excavations into sediments mapped as young alluvium can penetrate into Pleistocene age deposits that do yield fossils.

Marginal Resource Sensitivity

Marginal resource potential or marginal sensitivity are assigned to geologic formations that are composed of either volcaniclastic or metasedimentary rocks, but regardless have limited probability for producing fossils from certain formations at localized outcrops. Volcaniclastic rock can contain organisms that were fossilized by being covered with ash, dust, mud, or other debris from volcanoes. Metasedimentary rocks are sedimentary rocks that have been metamorphosed by heat or pressure caused by volcanoes or plutons. If those sedimentary rocks contained fossils, then some of those fossil may have survived the metamorphism and still be identifiable. Regardless, the probability of this actually happening is so limited, these formations are considered to be marginally sensitive for paleontologic resources.

No Resource Sensitivity

No resources sensitivity or no resource potential is assigned to geologic formations that are composed entire of volcanic or plutonic igneous rock and therefore do not have any potential for producing fossil remains. These formations have no paleontological resource potential and have no paleontological sensitivity. Artificial fill materials, for instance, are assigned no paleontological sensitivity or potential.

RESEARCH METHODS

Museum Record Search

A record search was completed by the San Diego Natural History Museum (SDNHM) on October 28th, 2019 (Appendix A). The purpose of the museum record search is to determine whether there are any known fossil localities that occur within or adjacent to the project area, identify the sensitivity of geological formations present within the project area, and determine whether a paleontological mitigation program is warranted to avoid or minimize potential adverse impacts of construction on paleontological resources.

Literature and Geological Map Review

The purpose of the literature searches was to determine whether any previously recorded fossil localities occur within the project area and to research the paleontological potential, stratigraphy, and general geology of the formation within the project area based on research that has been completed elsewhere in the City of Carlsbad or within San Diego County. The literature review included published scientific papers that were found at the library of the Biodiversity Research Center of the Californias (BRCC), SDNHM, and on the internet. The purpose of the geologic map review was to determine the names and number of geologic formations and surficial deposits within the project area, and their geographic distribution. The geologic map reviewed included Kennedy and Tan (2007).

Field Survey

The objective of the field survey was to document all scientifically important surface fossils within the project area. The field survey took place on October 28th, 2019 and examined the exposed flat surface of the project area. The north edge of the project drops too steeply into the adjacent canyon and is too densely covered in vegetation to be visually inspected. Field survey protocol included a pedestrian examination of all safely accessible fossil-bearing formational exposures and outcrops.

RESULTS

The result of the paleontological assessment performed by Red Tail was negative and no fossils localities were collected. The results of the field work and research are presented below.

Geologic Setting

The project area is located within the Coastal Plain geomorphic region of San Diego County west of the Peninsular Ranges region. The Coastal Plain geomorphic region is underlain by alternating marine and non-marine sedimentary rock units that are the result of 140 million years of geologic history in San Diego (Gastil and Higley, 1977). These ancient rock units are presently preserved at elevations up to 1,200 feet above current sea level, and though faulting has broken up many of these rock units in the southwestern portion of San Diego, these same rock units north of La Jolla remain relatively undeformed (Deméré and Walsh, 1993).

Stratigraphy

The paleontologically sensitive rock units underlying the project area in the vicinity of Palmer Way are mapped as Late Cretaceous Point Loma Formation underlain by Upper Cretaceous Lusardi Formation (Kennedy and Tan, 2007). Both formations and their paleontological sensitivity are described below and the geology of the project vicinity is shown in Figure 3. The project area has been modified due to previous construction of the adjacent road and retail development. Only previously displaced or graded dirt with modern trash and organic debris was observed on the surface during the survey. No previously undisturbed stratigraphy could be observed. Is it possible that outcrops showing stratigraphy of Lusardi or Point Loma Formation exists beyond the open space graded at the peak of this site, but the edges of this location were too steep and densely covered in chaparral to be visually inspected.

Point Loma Formation

The Point Loma Formation consists of alternating layers of bluish-gray shale, mudstone, and sandstone (Kennedy and Moore, 1971; Nilsen and Abbott, 1981). This formation is exposed in the sea cliffs along both sides of the Point Loma Peninsula, and in the sea cliffs from Bird Rock north to La Jolla Shores and is 275 feet thick. The Point Loma Formation was deposited on the sea floor during the late Cretaceous approximately 75 million years ago. Well-preserved fossil remains of numerous types of marine invertebrates such as nautiloids and ammonites have been discovered in this formation (Sundberg, 1981; Sundberg and Riney, 1984; Popenoe and Saul, 1987) and has produced sparse remains of terrestrial plants and dinosaurs including hadrosaur and nodosaur (Deméré, 1988).

Lusardi Formation

The Lusardi Formation was deposited during the late Cretaceous approximately 80 million years ago by alluvial fans along the western margin of the coastal mountain range (Nordstrom, 1970). It consists of reddish-brown, poorly sorted sandy pebble and boulder conglomerate with occasional lenses of arkosic sandstone (Deméré and Walsh, 1993). The maximum observed thickness of the Lusardi Formation is 415 feet thick in the Rancho Santa Fe area. Small fragments of plant material have been collected from exposures in Carlsbad but no identifiable fossils have been recovered. However, the age and terrestrial depositional setting of this rock unit suggests the potential for containing dinosaurs and other terrestrial vertebrates (Deméré and Walsh, 1993). This formation is exposed in Lusardi Canyon and La Zanja Canyon

near Rancho Santa Fe, along Poway east of Poway, in Alpine, Near the San Vicente Reservoir ad east of Palomar Airport in Carlsbad (Deméré and Walsh, 1993).

Museum Record Search and Literature Results

A paleontological record search and map review for this project was completed at the SDNHM and is included with this report (Appendix A). The results of the record search and map review were analyzed and both geologic units within the project area were subsequently assigned a paleontological resource sensitivity. The SDNHM has 73 recorded fossil localities within one mile of the project site. Four of those localities are from the Pleistocene-age Bay Point Formation, which is not anticipated to be present or within the project boundary or impacted during construction. The remaining sixty-nine localities are from the Point Loma Formation, which is anticipated to be present within the project boundary and is likely to be impacted by project construction.

The 69 fossils recorded from Point Loma Formation yielded trace fossils burrows and borings, impressions or remains of plants and marine invertebrates and vertebrates, and terrestrial vertebrates. The Point Loma Formation provides one of the best late Cretaceous fossil records, which includes the marine reptile mosasaurs (SDNHM, 2019), and some of the only know dinosaurs found in California (Coombs and Deméré, 1996; Deméré, 1988; Ford and Kirkland, 2001). The Point Loma Formation has also yielded a diverse assemblage of ancient marine invertebrates such as clams, snails, crabs, urchins, nautiluses and ammonites (Popenoe and Saul, 1987; Sundberg, 1979, 1981; Sundberg and Riney, 1984). This formation has been assigned a high paleontological sensitivity.

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The SDNHM does not have fossil localities from the Lusardi Formation within a one-mile radius of the project site. Only small plant material fragments have been collected from the Lusardi Formation in Carlsbad, but the age of this geologic unit and its terrestrial depositional setting implies the potential for preserving dinosaurs and other terrestrial vertebrates. Therefore, the Lusardi Formation is assigned a moderate paleontological sensitivity.

Field Survey Results

The property is a narrow strip of land about a quarter mile long at the edge of a steep sided canyon at least 150 feet deep. The widest part of the project site is only around a couple hundred feet wide. Vegetation covering the flat part of the project area includes invasive grasses and weeds, Russian Thistle, Eucalyptus trees and an occasional Lemonade Berry or Laurel Sumac Plant, which obstructed the view of the ground surface approximately 50 percent in most areas (Figures 4 and 5).

The ground cover appears to be 100 percent previously disturbed fill at the surface, consisting of brownish silty sand. Many types of rocks can be observed on this surface, including a moderate amount of rounded

igneous rocks ranging in size from pebbles to small cobbles. In some places there is decomposed granitic rock consisting of some disintegrating pieces and loose granitic sand. In other places are chunks of a chalky, calcareous sediment containing medium- to coarse-grained angular quartz sand. In the northern part of the project area were pieces of a concreted silty mudstone ranging in size from a couple smaller plum sized fragments to a larger chunk about 8 inches long. This largest piece was buried up to one surface and needed to be pried out to examine. An external mold of a single valve of the Cretaceous-age bivalve *Indogrammatadon* sp. about 35 mm in length was identified on the large piece. Two of the smaller rocks had fossils as well, but could not be identified beyond being bivalve or gastropod, though one of the small fossils may be an infant of a giant Cretaceous mussel.

Generally, the rock material examined at the surface on the project site, including the fossil-bearing concreted blocks containing Cretaceous fossil mollusk are most likely part of fill material, since they are isolated occurrences. However, the presence of the fossils, which most likely were obtained from sediment from some nearby property, indicate the potential for finding Cretaceous-age marine rock units at the project site, if excavation work goes deep enough.

CONCLUSIONS AND RECOMMENDATIONS

Past projects worked by the San Diego Natural History Museum in Carlsbad near the Valley View project site have included excavation work in the Eocene-age Santiago Formation, including Bressi Ranch and the Lowe's Home Improvement Center near the airport to the south, and many separate projects mostly to the immediate west of the project site in the Cretaceous-age Point Loma Formation.

This survey and fossil resources assessment has complied fully with all regulatory requirements pertaining to paleontological resources. No fossil localities were discovered during the survey. However, the high paleontological sensitivity of the Point Loma Formation and moderate paleontological sensitivity of the Lusardi Formation (Deméré and Walsh, 1993) suggest the potential for construction activity related to the project to result in impacts to paleontological resources. Implementation of a complete paleontological resource mitigation program is recommended for any proposed excavation, drilling or trenching activity that extends deep enough to encounter previously undisturbed fossiliferous deposits in order to ensure that potential impacts are reduced to a less than significant level.

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TABLES AND FIGURES

Project Name	Valley View				
Project Description	Paleontological pedestrian survey of the Valley View project area on Palmer Way				
Survey Date(s)	October 28th, 2019				
Project Area(s)	City of Carlsbad, San Diego County, California. The Project site is bordered to the west by Palmer Way and on all other sides by undeveloped land.				
Location (PLSS) and Land Owner/Managing Agency	**Quarter-Quarter**	**Section**	**Township**	**Range**	**Agency/ Owner**
	Unknown	Unknown	12S	4W	City of Carlsbad
Topographic Map(s)	San Luis Rey Quad 7.5' USGS				
Geologic Map(s)	Kennedy and Tan, 2007				
Mapped Geologic Formation(s) and Age	**Formation & Map Symbol**	**Age**		**Paleontological Sensitivity**	
	Kp: Point Loma Formation	Upper (Late) Cretaceous		High	
	Kl: Lusardi Formation	Upper (Late) Cretaceous		Moderate	
Surveyor(s)	N. Scott Rugh and Jennifer M. DiCenzo				
Documented Fossil Localities within 1 mile	The SDNHM has 73 recorded fossil localities within one mile of the project site: four localities from the Pleistocene-age Bay Point Formation, which is not anticipated to be impacted during project construction, and 69 localities from the Point Loma Formation.				
Surface Survey Results	Negative				
Recommendation(s)	No in situ fossils were recovered during the survey, only fossils on isolated rocks from an unknown fill origin were observed on the surface; however, a paleontological monitoring program should be developed for any future work that has the potential to adversely impact paleontologically sensitive sediments in the vicinity of the project area.				

Table 1. Valley View Survey Information Table.

Figure 1. Project Vicinity Map.

Figure 3. Project Area

Figure 2. Project Area Map

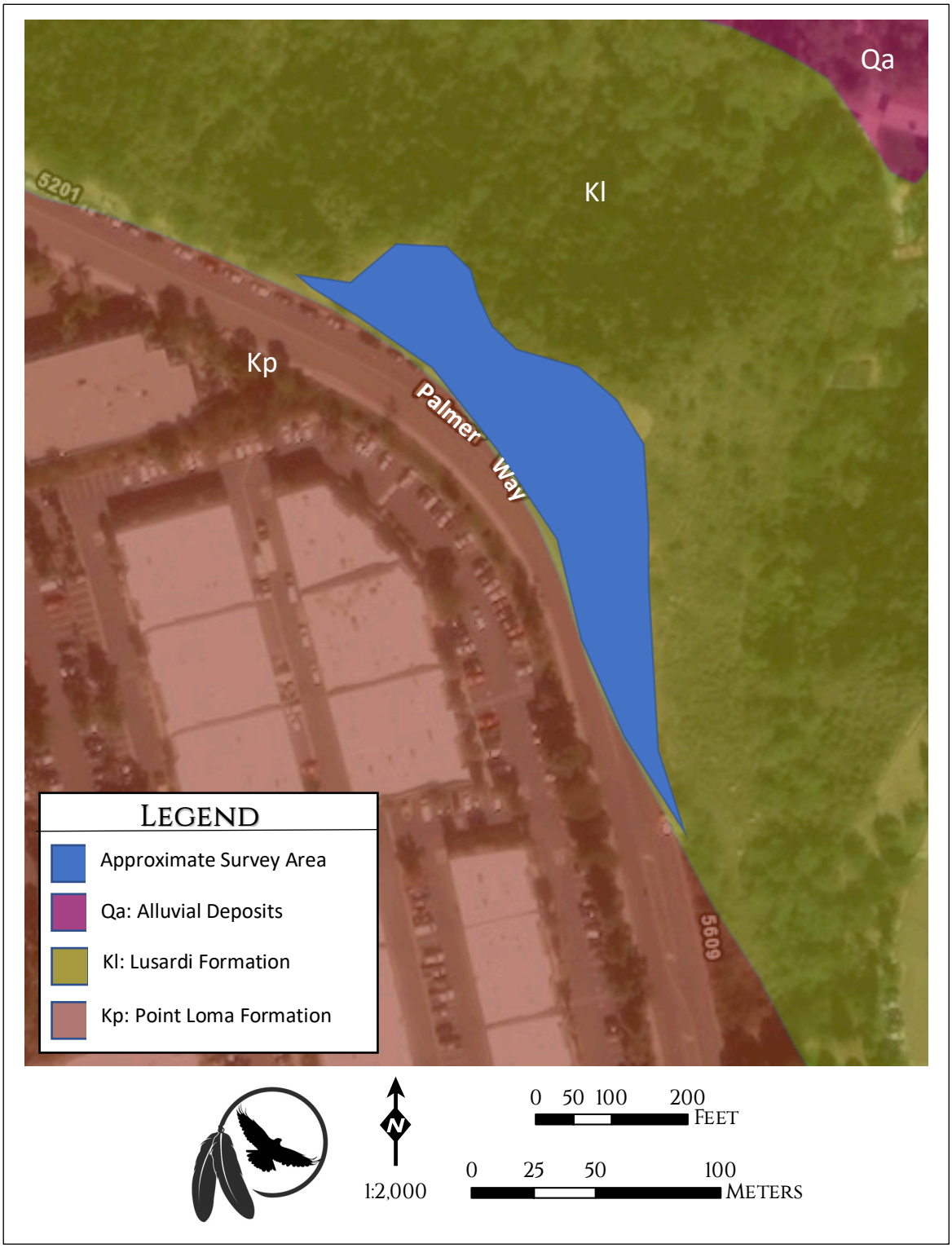

Figure 3. Geology of Project Area

Figure 4. North section of survey area, looking south.

Figure 5. South section of the survey area, looking north.

APPENDIX A

28 October 2019

Jennifer DiCenzo
Red Tail Environmental, Inc.
2627 Ariane Drive
San Diego, CA 92117

RE: Paleontological Records Search – Valley View Project

Dear Ms. DiCenzo:

This letter presents the results of a paleontological records search conducted for the Valley View Project (Project), located in the City of Carlsbad, San Diego County, California. The Project site is bordered to the west by Palmer Way and on all other sides by undeveloped land.

A review of published geological maps covering the Project site and surrounding area was conducted to determine the specific geologic units underlying the Project site. Each geologic unit was subsequently assigned a paleontological resource sensitivity (Deméré and Walsh, 1993). In addition, a search of the paleontological collection records housed at the San Diego Natural History Museum (SDNHM) was conducted in order to determine if any documented fossil collection localities occur at the Project site or within the immediate surrounding area.

Geologic Rock Units Underlying the Project Site

Published geological reports (e.g., Kennedy and Tan, 2007) covering the Project area indicate that the Project site is underlain by the late Cretaceous-age Point Loma Formation and Lusardi Formation. These geologic units and their paleontological sensitivities are summarized below. The SDNHM has 73 recorded fossil localities within one mile of the Project site. Four of these localities are from the Pleistocene-age Bay Point Formation, which is not anticipated to be impacted by Project construction. The remaining 69 localities are from the Point Loma Formation, and are discussed in greater detail below.

Point Loma Formation – The marine deposits of the late Cretaceous-age (approximately 75 million years old) Point Loma Formation underlie Project site in the vicinity of Palmer Way. The SDNHM has 69 recorded fossil localities from the Point Loma Formation within a 1-mile radius of the Project site. These localities yielded trace fossils (e.g., shell-lined burrows in matrix, and bryozoan, sponge, and clam borings in shell) and impressions or remains of plants (e.g., leaf, seed, and wood impressions of vascular plants, including cycads and relatives of the extant monkey puzzle tree) and marine invertebrates (e.g., foraminifers, bryozoans, brachiopods, annelid worms, snails, clams, mussels, oysters, tusk shells, chitons, ammonites, nautiloids, scalpellid barnacles, ostracods, shrimp, crabs, and sea urchins), marine vertebrates (e.g., sharks, rays, and bony fish), and terrestrial vertebrates (e.g., turtles, hadrosaurs, and a partial skeleton of the ankylosaur *Aletopelta coombsi*. The Point Loma Formation provides one of the best records of late Cretaceous fossils known from California, including some of the only known dinosaurs from the state (Coombs and Deméré, 1996; Deméré, 1988; Ford and Kirkland, 2001). Discovered fossils include marine vertebrates such as sharks, bony fish, and mosasaurs, as well as rare terrestrial plants, duck-billed dinosaurs (hadrosaurs), and armored dinosaurs (ankylosaurs) (Coombs and

Deméré, 1996; Deméré, 1988; Ford and Kirkland, 2001; SDNHM unpublished paleontological collections data). The Point Loma Formation has also produced diverse assemblages of ancient marine invertebrates, including clams, snails, nautiluses, ammonites, crabs, and sea urchins (Popenoe and Saul, 1987; Sundberg, 1979, 1981; Sundberg and Riney, 1984). These scientifically significant finds demonstrate the high paleontological sensitivity of the Point Loma Formation.

Lusardi Formation – Alluvial fan deposits of the late Cretaceous-age (approximately 80 million years old) Lusardi Formation underlie the majority of the Project site. The SDNHM does not have any recorded fossil localities from the Lusardi Formation within a 1-mile radius of the Project site. Only small fragments of plant material have been collected from exposures of the Lusardi Formation in Carlsbad; however, the Cretaceous age of this geologic unit and its terrestrial depositional setting suggest the potential preservation of dinosaurs and other terrestrial vertebrates. The Lusardi Formation is therefore assigned a moderate paleontological sensitivity.

Summary and Recommendations

The high paleontological sensitivity of the Point Loma Formation and moderate paleontological sensitivity of the Lusardi Formation in San Diego County (Deméré and Walsh, 1993), as well as the presence of numerous documented fossil collection localities near the Project site, suggests the potential for construction of the Project to result in impacts to paleontological resources. Any proposed excavation activities that extend deep enough to encounter previously undisturbed deposits of these geologic units have the potential to impact the paleontological resources preserved therein. For these reasons, implementation of a complete paleontological resource mitigation program during ground-disturbing activities is recommended.

The fossil collection locality information contained within this paleontological records search should be considered private and is the sole property of the San Diego Natural History Museum. Any use or reprocessing of the locality information contained within this document beyond the scope of the Valley View Project is prohibited.

If you have any questions concerning these findings please feel free to contact me at 619-255-0321 or kmccomas@sdnhm.org.

Sincerely,

Katie McComas, M.S.
Paleontological Report Writer & GIS Specialist
San Diego Natural History Museum

Enc: Figure 1: Project map
Appendix: List of SDNHM fossil localities in the vicinity of the Project

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RANCHO
CARLSBAD/SUNNY CREEK
Squires Reservoir
Rancho Carlsbad Golf Course
Project location
Sunny Creek Rd
El Camino Real
Impala Dr
Faraday Ave
College Blvd
Van Allen Way
Aston Ave
Rutherford Rd
Priestly Dr
Orion St
Loker Ave
Palomar Airport
Innovation Way
NORTH BEACH
McClellan-Palomar Airport
S11
S12
4494
4495
4493
4488
4491
4489
4490
4072
6239
2662
5918
5915
4467
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6049
5778
4463
4466
6048
3458
4162
6973
3457
3162
6974
5002
Sources: Bing Maps Hybrid Imagery, Microsoft et al., 2019; Terrain Hillshade, Esri et al., 2019
Project boundary
1 mile radius buffer
SDSNH localities
Orange
Riverside
map extent
San Diego
PALEOSERVICES
SAN DIEGO NATURAL HISTORY MUSEUM
FIGURE 1
Project Map
Valley View
City of Carlsbad, San Diego County, California
0
0.38
scale in miles
N

Appendix: Locality List
San Diego Natural History Museum
Department of Paleontology

Locality Number	Locality Name	Location	Elevation (feet)	Geologic Unit	Era	Period	Epoch
5002	La Costa Development	City of San Diego, San Diego County, California	300	Bay Point Formation	Cenozoic	Quaternary	Pleistocene
4493	Sunny Creek #5	City of Carlsbad, San Diego County, California	120	Bay Point Formation, unnamed nonmarine deposit	Cenozoic	Quaternary	Pleistocene
4494	Sunny Creek #6	City of Carlsbad, San Diego County, California	120	Bay Point Formation, unnamed nonmarine deposit	Cenozoic	Quaternary	Pleistocene
4495	Sunny Creek #5	City of Carlsbad, San Diego County, California	112	Bay Point Formation, unnamed nonmarine deposit	Cenozoic	Quaternary	Pleistocene
2662	El Camino Real	San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
2938	Carlsbad - Madonna Hill	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
2998	Letterbox Canyon	San Diego County, California	120	Point Loma Formation	Mesozoic	Cretaceous	
3162	Carlsbad Research Center	City of Carlsbad, San Diego County, California	280	Point Loma Formation	Mesozoic	Cretaceous	
3387	College Boulevard - Site 21A Roadcut	San Diego County, California	175	Point Loma Formation	Mesozoic	Cretaceous	
3392	College Boulevard - Dinosaur Quarry-Site 31	City of Carlsbad, San Diego County, California	163	Point Loma Formation	Mesozoic	Cretaceous	
3402	Carlsbad Research Center - Site 28	City of Carlsbad, San Diego County, California	160	Point Loma Formation	Mesozoic	Cretaceous	
3403	Carlsbad Research Center - Site 29	City of Carlsbad, San Diego County, California	148	Point Loma Formation	Mesozoic	Cretaceous	
3404	Carlsbad Research Center, Pad 76 - Site 30	City of Carlsbad, San Diego County, California	168	Point Loma Formation	Mesozoic	Cretaceous	
3405	College Boulevard	City of Carlsbad, San Diego County, California	150	Point Loma Formation	Mesozoic	Cretaceous	
3454	College Boulevard - Site 24	City of Carlsbad, San Diego County, California	248	Point Loma Formation	Mesozoic	Cretaceous	
3458	Carlsbad Research Center - Pad 49 - Site 26	City of Carlsbad, San Diego County, California	255	Point Loma Formation	Mesozoic	Cretaceous	
4071	Taylor Made Golf Facility "main site"	City of Carlsbad, San Diego County, California	150	Point Loma Formation	Mesozoic	Cretaceous	
4072	Taylor-Made Golf Facility - "Crab Hill"	City of Carlsbad, San Diego County, California	140	Point Loma Formation	Mesozoic	Cretaceous	
4073	Taylor-Made Golf Facility - "Driving Range"	City of Carlsbad, San Diego County, California	170	Point Loma Formation	Mesozoic	Cretaceous	
4162	Marriott Residence Inn-Faraday/College	City of Carlsbad, San Diego County, California	255	Point Loma Formation	Mesozoic	Cretaceous	
4463	Carlsbad Corporate Center	City of Carlsbad, San Diego County, California	320	Point Loma Formation	Mesozoic	Cretaceous	
4464	Carlsbad Corporate Center	City of Carlsbad, San Diego County, California	322	Point Loma Formation	Mesozoic	Cretaceous	
4465	Carlsbad Corporate Center	City of Carlsbad, San Diego County, California	220	Point Loma Formation	Mesozoic	Cretaceous	
4466	Carlsbad Corporate Center	City of Carlsbad, San Diego County, California	315	Point Loma Formation	Mesozoic	Cretaceous	
4467	First Mechanical	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
4488	Sunny Creek #1	City of Carlsbad, San Diego County, California	220	Point Loma Formation	Mesozoic	Cretaceous	
4489	Sunny Creek #2	City of Carlsbad, San Diego County, California	220	Point Loma Formation	Mesozoic	Cretaceous	
4490	Sunny Creek #3	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
4491	Sunny Creek #4	City of Carlsbad, San Diego County, California	140	Point Loma Formation	Mesozoic	Cretaceous	
5756	Clay Pit, Carlsbad - Holden Ostracod Types	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
5760	Fox-Miller - Fat Ammonite Bed	City of Carlsbad, San Diego County, California	194	Point Loma Formation	Mesozoic	Cretaceous	
5777	Faraday Avenue Extension	City of Carlsbad, San Diego County, California	310	Point Loma Formation	Mesozoic	Cretaceous	
5778	Faraday Avenue Extension	City of Carlsbad, San Diego County, California	240	Point Loma Formation	Mesozoic	Cretaceous	
5779	Faraday Avenue Extension	City of Carlsbad, San Diego County, California	230	Point Loma Formation	Mesozoic	Cretaceous	
5794	Fox-Miller	City of Carlsbad, San Diego County, California	285	Point Loma Formation	Mesozoic	Cretaceous	

Locality Number	Locality Name	Location	Elevation (feet)	Geologic Unit	Era	Period	Epoch
5795	Fox-Miller	City of Carlsbad, San Diego County, California	225	Point Loma Formation	Mesozoic	Cretaceous	
5796	Faraday Avenue Extension	City of Carlsbad, San Diego County, California	325	Point Loma Formation	Mesozoic	Cretaceous	
5797	Faraday Avenue Extension	City of Carlsbad, San Diego County, California	325	Point Loma Formation	Mesozoic	Cretaceous	
5821	Fox-Miller	City of Carlsbad, San Diego County, California	280	Point Loma Formation	Mesozoic	Cretaceous	
5822	Fox-Miller	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
5823	Fox-Miller	City of Carlsbad, San Diego County, California	230	Point Loma Formation	Mesozoic	Cretaceous	
5824	Fox-Miller	City of Carlsbad, San Diego County, California	280	Point Loma Formation	Mesozoic	Cretaceous	
5825	Fox-Miller	City of Carlsbad, San Diego County, California	235	Point Loma Formation	Mesozoic	Cretaceous	
5912	Fox-Miller - Coralliochama Bed	City of Carlsbad, San Diego County, California	268	Point Loma Formation	Mesozoic	Cretaceous	
5914	Fox-Miller - Middle Hill	City of Carlsbad, San Diego County, California	215	Point Loma Formation	Mesozoic	Cretaceous	
5915	Fox-Miller	City of Carlsbad, San Diego County, California	270	Point Loma Formation	Mesozoic	Cretaceous	
5916	Fox-Miller - Nail Wall Cut	City of Carlsbad, San Diego County, California	265	Point Loma Formation	Mesozoic	Cretaceous	
5917	Fox-Miller - Nail Wall Cut	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
5918	Fox-Miller - Nail Wall Cut	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
5919	Fox-Miller - Sandstone Marker Bed	City of Carlsbad, San Diego County, California	260	Point Loma Formation	Mesozoic	Cretaceous	
5920	Fox-Miller - Middle Hill	City of Carlsbad, San Diego County, California	250	Point Loma Formation	Mesozoic	Cretaceous	
5921	Fox-Miller - Middle Hill	City of Carlsbad, San Diego County, California	226	Point Loma Formation	Mesozoic	Cretaceous	
5937	Fox-Miller - Ammonite Canyon	City of Carlsbad, San Diego County, California	198	Point Loma Formation	Mesozoic	Cretaceous	
6048	Palomar Waste Transfer Station	City of Carlsbad, San Diego County, California	302	Point Loma Formation	Mesozoic	Cretaceous	
6049	Palomar Waste Transfer Station	City of Carlsbad, San Diego County, California	321	Point Loma Formation	Mesozoic	Cretaceous	
6239	El Camino Real Widening	City of Carlsbad, San Diego County, California	252	Point Loma Formation	Mesozoic	Cretaceous	
6973	Carlsbad Desalination Pipeline	City of Carlsbad, San Diego County, California	245	Point Loma Formation	Mesozoic	Cretaceous	
6974	Carlsbad Desalination Pipeline	City of Carlsbad, San Diego County, California	290	Point Loma Formation	Mesozoic	Cretaceous	
6975	Carlsbad Desalination Pipeline	City of Carlsbad, San Diego County, California	311	Point Loma Formation	Mesozoic	Cretaceous	
6976	Carlsbad Desalination Pipeline	City of Carlsbad, San Diego County, California	270	Point Loma Formation	Mesozoic	Cretaceous	
3162A	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162B	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162C	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162D	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162E	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162F	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162G	Carlsbad Research Center	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162L	Carlsbad Research Center	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162M	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3162N	Carlsbad Research Center - Phase I	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	

Locality Number	Locality Name	Location	Elevation (feet)	Geologic Unit	Era	Period	Epoch
3162O	Carlsbad Research Center	City of Carlsbad, San Diego County, California		Point Loma Formation	Mesozoic	Cretaceous	
3457A	Carlsbad Research Center	City of Carlsbad, San Diego County, California	265	Point Loma Formation	Mesozoic	Cretaceous	
3457B	Carlsbad Research Center	City of Carlsbad, San Diego County, California	265	Point Loma Formation	Mesozoic	Cretaceous	