Appendices

Appendix E3: Paleontological Resources for the Solana Project, City of Torrance, Los Angeles County, California

Appendices

This page intentionally left blank.

October 5, 2018

Derek Empey
Senior Vice President of Development/Partner
Reylenn Properties, LLC
444 S. Cedros Avenue, Suite 180
Solana Beach, CA 92075

RE: Paleontological Resources Assessment for the Solana Project, City of Torrance, Los Angeles County, California

Dear Mr. Empey:

Paleo Solutions, Inc. (Paleo Solutions) was retained by Reylenn Properties, LLC (Reylenn) to conduct a paleontological resources assessment for the Solana Project (Project) in the City of Torrance, Los Angeles County, California. This work was required by the City of Torrance to fulfill their role as the lead agency under the California Environmental Quality Act (CEQA). This report incorporates the results of a geologic map review, a literature review, an online fossil database review, a museum records search, and a field reconnaissance of the site. All paleontological work was completed in compliance with CEQA, Los Angeles County and City of Torrance guidelines, and best practices in mitigation paleontology (Murphey et al., 2014).

1.0 PROJECT LOCATION

The Project is located in an abandoned quarry near the intersection of Hawthorne Boulevard and Via Valmonte on the northern foot of the Palos Verdes Hills in the City of Torrance within Los Angeles County, California (Attachment A: Figure 1). The site is an approximately 24.7 acres that is currently vacant. Of the approximately 24.7-acre property, approximately 5.7 acres will be developed (hereafter, referred to as the "Project area"), and 19 acres of open-space preserve. Note that this assessment only applies to the 5.7-acre Project area planned for development and not the 19-acre open-space preserve. The Project area is bounded by Via Valmonte to the north and west, Hawthorne Boulevard to the east, and a 200- to 250-foot-high, north-facing slope with gradients steeper than 1:1 (horizontal to vertical) to the south (Attachment A: Figure 2). The overall Project site is located within the following Assessor's Parcel Numbers (APNs): 7547-001-018 through -021, 7547-001-024 through -026, and 7547-002-005 through -011.

2.0 PROJECT DESCRIPTION

Reylenn plans to construct a multi-family residential development, which will include three multi-family residential buildings, a six-story parking structure, and a community area. Each multi-family residential building will consist of four-stories of residential units overlying a parking area.

Previous diatomite and diatomaceous soil mining activities have significantly altered the site topography, such that the existing site topography generally slopes toward the center of the site, creating a shallow basin. The central basin area was previously mined to an elevation approximately 150 feet above mean sea level (AMSL) and subsequently backfilled to create two staggered, gently sloping pads. Of the two pads, the lower pad ranges in elevation from 190 to 220 feet AMSL; whereas, the relatively higher pad ranges in elevation from 235 to 245 feet AMSL. According to geotechnical logs from the site, up to 75 feet of artificial is present at the site (Geocon West, 2017). Along the perimeter of the site, existing slopes located on the northwest and east-northeast have been previously graded during previous mining operations.

Earthwork associated with this Project will include grading the topographically higher southeastern portion and filling the central and northern low areas to create one level surface for construction the multi-family residential development. Additionally, an access road will be graded through the site connecting the southeastern portion of the Project area to Hawthorne Boulevard.

3.0 REGULATIONS

3.1 STATE REGULATORY SETTING

California Environmental Quality Act (CEQA)
The procedures, types of activities, persons, and public agencies required to comply with CEQA are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations) and further amended January 4, 2013. One of the questions listed in the CEQA Environmental Checklist is: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines Section 15064.5 and Appendix G, Section V, Part C).

3.2 LOCAL REGULATORY SETTING

The City of Torrance does not have any goals or policies regarding paleontological resources listed in the General Plan (City of Torrance, 2009).

4.0 METHODS

Paleo Solutions reviewed geologic mapping and grading plans by KHR Associates (2018), geologic maps by Dibblee et al. (1999), and geotechnical reports by Geocon West (2017). A paleontological records search was conducted at the Natural History Museum of Los Angeles County (LACM) by Samuel A. McLeod, Ph.D. The results of the records search (dated September 4, 2018) are attached as Attachment B. The museum records search was supplemented by a review of online fossil databases conducted by Paleo Solutions staff. A field reconnaissance survey was conducted by Paleo Solutions' Senior Paleontologist Mathew Carson, M.S., on September 4, 2018. Based on the results of an assessment of existing data and the field reconnaissance, the paleontological potential of the geologic units underlying the Project area were assessed with the Bureau of Land Management (BLM) Potential Fossil Yield Classification (PFYC) system (BLM, 2008; 2016).

4.1 CRITERIA FOR EVALUATING PALEONTOLOGICAL POTENTIAL

The PFYC system was developed by the BLM (BLM, 2008, 2016). Because of its demonstrated usefulness as a resource management tool, the PFYC has been utilized for many years for projects across the country, regardless of land ownership. It is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of 1 (very low potential) to 5 (very high potential). The classification system is founded on two basic facts of paleontology: occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them, and the likelihood of the presence of fossils can be broadly predicted from the distribution of geologic units at or near the surface. Therefore, geologic mapping, as the documentation of geologic unit distribution, is a reliable method for assessing the potential of geologic units to preserve fossils.

The PFYC system classifies geologic units on the relative abundance of scientifically significant vertebrate, invertebrate, or plant fossils and their sensitivity to adverse impacts, with a higher classification number indicating a higher potential for fossil occurrences. This classification is preferably applied to the geologic formation, member, or other distinguishable unit at the most detailed mappable level and is not intended to be applied to specific paleontological localities or small areas within a geologic unit. Although significant localities may occasionally occur in a geologic unit, the existence of a few important fossils or localities widely scattered over a large area does not necessarily indicate a higher classification for the unit. This system is intended to aid in predicting, assessing, and mitigating paleontological resources. The PFYC ranking system is summarized in Table 1.

Table 1. Potential Fossil Yield Classification (BLM, 2016)

BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
1 = Very Low Potential	Geologic units are not likely to contain recognizable paleontological resources.
	Units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
	Units are Precambrian in age.
	Management concern is usually negligible, and impact mitigation is unnecessary except in rare or isolated circumstances.
2 = Low	Geologic units are not likely to contain paleontological resources.
	Field surveys have verified that significant paleontological resources are not present or are very rare.
	Units are generally younger than 10,000 years before present.
	Recent eolian deposits
	Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely
	Management concern is generally low, and impact mitigation is usually unnecessary except in occasional or isolated circumstances.
3 = Moderate Potential	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
	Marine in origin with sporadic known occurrences of paleontological resources.
	Paleontological resources may occur intermittently, but these occurrences are widely scattered
	The potential for authorized land use to impact a significant paleontological resource is known to be low-to-moderate.
	Management concerns are moderate. Management options could include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Opportunities may exist for hobby collecting. Surface-disturbing activities may require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action and whether the action could affect the paleontological resources.
4 = High Potential	Geologic units that are known to contain a high occurrence of paleontological resources.
	Significant paleontological resources have been documented but may vary in occurrence and predictability.
	Surface-disturbing activities may adversely affect paleontological resources.
	Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
	Illegal collecting activities may impact some areas.
	Management concern is moderate to high depending on the proposed action. A

BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
	field survey by a qualified paleontologist is often needed to assess local conditions. On-site monitoring or spot-checking may be necessary during land disturbing activities. Avoidance of known paleontological resources may be necessary.
5 = Very High Potential	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources.
	Significant paleontological resources have been documented and occur consistently
	Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.
	Unit is frequently the focus of illegal collecting activities.
	Management concern is high to very high. A field survey by a qualified paleontologist is almost always needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.
U = Unknown	Geologic units that cannot receive an informed PFYC assignment
	Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is unknown.
	Geologic units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.
	Scientific literature does not exist or does not reveal the nature of paleontological resources.
	Reports of paleontological resources are anecdotal or have not been verified.
	Area or geologic unit is poorly or under-studied.
	BLM staff has not yet been able to assess the nature of the geologic unit.
	Until a provisional assignment is made, geologic units with unknown potential have medium to high management concerns. Field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

5.0 RESULTS

5.1 ANALYSIS OF EXISTING DATA

5.1.1 Background Geology

The Project is located on the northern foot of the Palos Verdes Hills within the southwestern block of the Los Angeles Basin (as defined by the US Geological Survey [see Norris and Webb, 1990]), a topographically lowland area situated within the Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges Geomorphic Province consists of a series of northwest-southeast oriented complex of blocks and similarly oriented faults (Norris and Webb, 1990), which formed by structural activity associated with the San Andreas Fault. The Peninsular Ranges Geomorphic Province includes not only the Los Angeles Basin but also the Channel Islands, with most of the province submerged offshore. This province is bound in the north by the east-west trending Transverse Ranges, to the east by the Colorado Desert and the Gulf of California. Basement rocks of the Peninsular Ranges are extensive Jurassic and Cretaceous igneous rocks associated with Nevadan plutonism and pre-Nevadan development of the Sierra Nevada Mountains (Norris and Webb, 1990). Cretaceous-aged marine sedimentary rocks are well represented within the Peninsular Ranges; however, post-Cretaceous-aged rocks consist of volcanic, marine, and nonmarine sedimentary rocks, unconformably overlie Cretaceous-aged sedimentary rocks or basement rocks, and form a thin veneer across the province. Within the Los Angeles Basin, post-Cretaceous marine sections up to 40,000 feet thick have been noted by researchers (Norris and Webb, 1990). Late Tertiary-aged rocks consist of marine and continental sediments limited in their extent to coastal areas and basins.

Late Tertiary to Quaternary sediments are thick and widespread in the northern Peninsular Ranges, particularly in the Los Angeles and Ventura basins. During the late Tertiary, volcanism was less extensive throughout the Peninsular Ranges, unlike other southern California geomorphic provinces, and thick Miocene- and Pliocene-aged sediments fill much of the Los Angeles Basin and intramontane basins. Quaternary deposits include fluviatile and lacustrine sediments within the interior of the Los Angeles Basin and marine terrace deposits along the coast (Norris and Webb, 1990).

Geologic mapping by Dibblee et al. (1999) and KHR Associates (2018) indicates that the Project area is underlain by middle to Late Miocene-aged Monterey Formation (Tm) in the Palos Verdes Hills and the Pleistocene-aged San Pedro Sand (Qsp); Pleistocene-aged Palos Verdes Sand (Qm); and Holocene-aged landslide debris or slough deposits (Qls) at the surface in the lower lying areas at the base of the Palos Verdes Hills (Attachment A: Figure 3). Geologic mapping by Dibblee et al. (1999) does not separate the terrestrial Pleistocene-aged Palos Verdes Sand, which overlies the San Pedro Sand (Qsp), from Pleistocene-aged older alluvium; thus, the Palos Verdes Sand is included with the older alluvium in this assessment. Throughout the central basin and the northwestern and northeastern portions of the Project area, variably thick deposits of Recent artificial fill (af) are present, ranging in thickness from 2 to 75 feet thick according to geotechnical assessments of the Project area (Geocon West, 2017).

All of the geologic units discussed in this report are characteristic of both the Palos Verdes Hills area and portions of the larger Los Angeles Basin.

5.1.1.1 Monterey Formation (Tm)

The Monterey Formation is a discontinuous belt of fine-grained, siliceous sediments that extend from northern California to southern California, as well as offshore and onto the Channel Islands (Behl, 1999). The type locality for the formation is located in the region east of Monterey, and it was originally described by Blake (1856). The sediments were deposited during the Late Miocene (approximately 5 million years ago) in deep marine environments along the North American Plate boundary. Monterey Formation rocks record, in part, the transition of the California margin from a convergent to a transform setting (Behl, 1999). Specifically, the Monterey Formation sediments accumulated in the extensional rift basins that formed along the continental margin as the San Andreas Fault was forming and lengthening (Behl, 1999). The rocks in this geographically and temporally extensive formation, although variable in lithology and thickness, generally comprise one or more of the following rock types: diatomite, diatomaceous and siliceous mudrocks, porcelanite, chert, calcareous and phosphatic mudrocks, dolostone, and limestone (Bramlette, 1946). According to Dibblee et al. (1999), the middle to Late Miocene-aged Monterey Formation (Tm) within the Project area consists of soft, white, punky, laminated diatomaceous shale and mudstone, up to 125 meters thick, subclassified as the Valmonte Diatomite of the Mohnian Stage (Rowell, 1982). During the geotechnical study of the Project area, Geocon West (2017) noted the Monterey Formation in two boreholes, one located within the southern portion of the central basin within the Project area, and the other located atop the topographic high immediately outside the Project area. Depth to the Monterey Formation ranged from 5 feet atop the southern hill to 20 feet within the southern portion of the central basin (Geocon West, 2017). The Monterey Formation was described as interbedded white diatomaceous siltstone and sandstone and brown to yellowish-brown clayey siltstone, with localized siliceous and chert-rich beds, all belonging to the Valmonte Diatomite (Geocon West, 2017). Exposed on the surface on the large rock face, the Monterey Formation consisted of diatomaceous siltstone and sandstone, with localized lenses of well-cemented siliceous siltstone, fossiliferous sandstone, and cherty sandstone, thinly bedded, with well-developed beds (Geocon West, 2017).

The Monterey Formation contains abundant fossilized foraminifera as well as larger invertebrate and vertebrate fossils, particularly mollusks and fish, respectively (Bramlette, 1946). Fish remains are common in both diatomaceous and harder siliceous beds and recorded specimens include bony fish (*Ganolytes cameo*, Osteichthyes), rock bass (*Paralabrax*), ray-finned fish (*Oligodiodon vetus*), and herring (*Xyne grex*) (Bramlette, 1946; UCMP, 2018). Larger vertebrate fossils are less common and include remains of turtle

(Dermochelyidae), booby (*Palaeosula stocktoni*), ray (*Myliobatis*), white shark (*Isurus hastalis*), hook tooth mako shark (*Isurus planus*), requiem shark (*Galeocerdo aduncus, Carcharhinus*), eared seal (*Allodesmus kernensis*, Otariidae), whale (*Plesiocetus occidentalis*, *Kampholophos serrulus*, Physeteridae), sea cow (*Dusisren jordani*, Sirenia), and porpoise (*Salumiphocaena stocktoni*, *Loxolithax stocktoni*) (UCMP, 2018). The Monterey Formation in Los Angeles County has produced vertebrate fossils of booby (*Palaeosula stocktoni*), whale (Cetacea and Physeteridae), porpoise (*Salumiphocaena stockoni* and *Loxolithax stockoni*), and hippopotamus-like creature (*Desmostylus hesperus*) (UCMP, 2018).

Invertebrates recorded from the Monterey Formation in California include mollusks, echinoids, annelids, and crustaceans. Specimens include sand dollar (*Echinarachnius brewerianus*, *Astrodapsis cuyamanus*, *A. perrini*, *A. schencki*, and *Scutella merriami*), gastropod (*Turritella chaneyi, T. pachecoensis*, and *Brackysphingus liratus*), bivalve (*Spisula albaria, S. catilliformis, Anadara obispoana, A. montereyana, Meretrix meretrix, Delectopecten peckhami, Scapharca obispensis, Lucinoma aequizonata, Tellina cryphia,* and Vesicomyidae), fanworm (*Pectinaria*), and soft body crab (Pinnotheriidae) (UCMP, 2018). Mollusks are generally more common in the diatomaceous units and rare in the siliceous beds, where they are only represented by *Arca* and Pectinidae (Bramlette, 1946). Additional recorded fossils include terrestrial plant material, horse teeth, and a dog skull (Bramlette, 1946). Within the San Pedro and Palos Verdes Hills area within Los Angeles County, the Monterey Formation contains abundant microfossils, including radiolarians and foraminiferans (UCMP, 2018).

The Monterey Formation has a very high paleontological potential (PFYC 5) using BLM (2008; 2016) guidelines.

5.1.1.2 San Pedro Sand (Qsp)

According to Black (1991), the early Pleistocene-aged San Pedro Sand (Qsp) consists of yellow to light brown and gray, cross-bedded to massive, poorly consolidated marine pebble gravel, sand, and silty sand; coarse-grained pebble gravel is derived mostly from Miocene-aged hard siliceous shale and limestone detritus (Dibblee et al., 1999). Sediments comprising the San Pedro Sand were deposited in a nonmarine to shallow marine, mostly deltaic paleoenvironment, with the depth of water ranging from 18 to 92 meters (Jacobs, 2005). The San Pedro Sand unconformably overlies the Pliocene-aged Fernando Formation and is approximately 422 feet thick, dipping 8º to 19º northeast (Oldroyd, 1924; Woodring et al., 1946; Jacobs et al., 2000). Previous investigations had broken this geologic unit into two distinct horizons separated by an unconformity: the Lower San Pedro Series and Upper San Pedro Series (Arnold and Arnold, 1902). The Lower San Pedro Series consists of gray sandstone deposits in a nearshore environment. Conversely, the Upper San Pedro Series consists of lime-hardened gravel overlain by a thick layer of fine-grained sand (Arnold and Arnold, 1902; Woodring et al., 1946). Since Arnold and Arnold's (1902) description of the geologic unit, the Lower San Pedro Series is now referred to as the San Pedro Sand, and the Upper San Pedro Series is now referred to as the Palos Verdes Sand (Woodring et al., 1946), which was combined with Pleistocene-aged older alluvium in the geologic map produced by Dibblee et al. (1999) (see Pleistocene older alluvium below for an assessment of the Palos Verdes Sand).

In the immediate vicinity of the Project area, the San Pedro Sand was studied by Woodring et al. (1946), who noted cross-bedded, fossiliferous, gray sands near the base of the formation, which decrease in abundance up-section, and are capped with reddish-brown sand. Woodring et al. (1946) recognized two informal members: the Timms Point Silt and the Lomita Marl. The Timms Point Silt consists of brown silty sand and sandy silt and contains pebbles; the Lomita Marl consists of calcareous rocks and sand and contains mollusk shells and organics (Woodring et al., 1946). Both informal members are situated at the base of the San Pedro Sand, with evidence that these layers were uplifted and eroded prior to the deposition of the overlying San Pedro sands (Jacobs et al., 2000; Woodring et al., 1946).

The Pleistocene-aged San Pedro Sand (Qsp) underlies the central portion of the Project area, as well as the northwestern ridge and the northeastern ridge. During the geotechnical investigation, the depth to the San

Pedro Sand varied widely across the Project area from 2 to 5 feet near the northeastern boundary of the Project area to 25 to 50 feet within the central portion of the central basin, and as much as 75 feet depth to the San Pedro Sand in one central basin borehole. According to Geocon West (2017), the San Pedro Sand consists of light gray to yellowish-brown (where oxidized), fine-grained to coarse-grained sand that is generally massive to weakly to moderately bedded, moderately cemented to friable (uncemented), with local gravel-rich beds and rounded cobble beds.

The San Pedro Sand is known for its abundant and diverse fossil fauna. Previously recorded fossil localities have yielded three species of foraminifera, four species of bryozoans, over 242 species of mollusks, 11 species of crabs, and three species of sea urchins (Miller, 1930; Oldroyd, 1924; Woodring, 1952). Fossil vertebrate remains have also been recovered from the San Pedro Sand and include primarily fish, ray, and shark taxa, with vertebrae, teeth, and otoliths comprising most records, as well as avian and terrestrial fossil taxa. Studies by Fitch (1967) identified abundant species of fish, specifically the shiner perch (*Cymatogaster aggregata*), and fish families, particularly the Cottidae, which includes six distinct genera identified from the San Pedro Sand. The extant bat ray species, *Myliobatis californicus*, is abundant, as well as teeth of the great white shark relative, *Carcharodon*. Additionally, fossil vertebrates recovered from the San Pedro Sand include bird, turtle, horse, bison, camel, saber-toothed cat, ground sloth, elephant, rodent, and whale, albeit to a lesser degree than fossil fish (Miller, 1930; Woodring, 1952). Nineteen species of bird, including cormorant, duck, goose, gull, sea eagle, and quail have been recorded (Miller, 1930; Howard, 1948). Fish fossil taxa included requiem sharks (*Carcharhinus* sp.); pacific staghorn sculpins (*Leptocottus armatus*); sting rays (cf. Myliobatiformes); pile perches (*Rhacochilus vacca*); horn sharks (*Heterodontus francisci*); bat rays (*Myliobatis californica*); spotted cusk-eels (*Chilara taylori*); large-tooth flounders (*Paralichthys californicus*); drums, croakers, and hardheads (*Roncador stearnsii*, *Seriphus politus*); pacific angel sharks (*Squattina californica*); leopard sharks (*Triakis semifasciata*); bony fishes (*Teleostei* sp.); and round stingrays (*Urobatis halleri*). Amphibian fossil groups include frogs (Anura), and reptile fossil groups include colubrid snakes (Colubridae), pond turtles (*Aechmophorus occidentalis*), and rattlesnakes (*Crotalus* sp.). Bird fossil groups include swans, geese, and ducks (*Anas clypeata*, *Aythya affinis*, *Bucephala albeola*, *Melanitta perspicillata*, *Melanitta fusca*, *Mergus serrator*); loons (*Gavia immer*, *Gavia* cf. *pacifica*); cormorants (*Phalacrocorax* cf. *auritus*); grebes (*Aechmophorus occidentalis*); rails, gallinules, and coots (*Fulica americana*); and sandpipers (*Catoptrophorus semipalmatus*). Mammal fossil groups include horse (Equidae); deer (*Odocoileus hemionus*); rodents, such as unidentifiable Cricetidae, pocket gophers (*Thomomys bottae*), and squirrels (*Spermophilus beecheyi*); and rabbits and hares (*Sylvilagus* sp., *Lepus* sp.).

According to the Paleobiology Database (PBDB) (2018), several scientifically significant fossil localities have been recorded from the San Pedro Sand. Within one mile of the Project area, the PBDB (2018) contains records which yielded northern kelp crab (*Pugettia producta*), school shark (*Galeorhinus* sp.), gray whale (*Eschrichtius robustus*), undetermined whale (Cetacea), and ground sloth (*Nothrotherium shastensis*) (PBDB, 2018). Additionally, the PBDB contains records for solitary coral (*Caryophyllia arnoldi*), sea otter (*Enhydra lutris*), and sea lion (*Zalophus* sp.) (PBDB, 2018). The MioMap online fossil database was also assessed and contained one record of tapir (*Tapirus californicus* cf.) of Rancholabrean North American Land Mammal Age (NALMA) (Carrasco et al., 2005). The UCMP online fossil locality database contains records of numerous fossils yielding microfossils and invertebrates, including several species of foraminifers, gastropods, scaphopods, bivalves, crustaceans, and echinoids (UCMP, 2018).

Based on the high potential for scientifically significant paleontological resources, the Pleistocene-aged San Pedro Sand has a high paleontological potential (PFYC 4).

5.1.1.3 Older Alluvium/Palos Verdes Sand (Qm)

Older alluvium/Palos Verdes Sand (Qm) was deposited during the Pleistocene (approximately 2.5 million years ago to 10,000 years ago) (Dibblee et al., 1999). This geologic unit from the Palos Verdes Hills consists of sandy loam and loamy clay, with sand and pebble gravel, derived mostly from Miocene-aged hard siliceous shale and limestone of the Monterey Formation (Woodring et al., 1946; Dibblee et al., 1999). Pleistocene-aged Palos Verdes Sand (Qm) is not differentiated from Pleistocene-aged older alluvium in Dibblee et al. (1999) and consists of shallow marine to nonmarine coarse-grained deposits, such as nonmarine terrace cover and sand and pebble gravel in the Palos Verdes Hills, with pebbles derived mostly from Miocene hard siliceous shale and limestone. The Palos Verdes Sand (Qm) is predominantly mapped by KHR Associates (2018) within the Project area along the northeastern ridge, where it overlies the San Pedro Sand (Qsp). During the geotechnical study by Geocon West (2017), the Palos Verdes Sand (Qm) was determined to be exposed on the surface along the northeastern ridge and has a maximum depth of 15 feet. During trenching within the Project area, the observed older alluvium/Palos Verdes Sand (referred to as marine sand by KHR Associates, 2018) consisted of light brown, brown, and reddish-brown, fine-grained to medium-grained sand, silty sand, and sandy silt, with lenses of coarse-grained sand and rounded gravel, massive to weakly horizontally bedded (Geocon West, 2017).

Taxonomically diverse and locally abundant Pleistocene animals and plants have been collected from older alluvial deposits throughout southern California and include mammoth (*Mammuthus*), mastodon (*Mammut*), camel (Camelidae), horse (Equidae), bison (*Bison*), giant ground sloth (*Megatherium*), peccary (Tayassuidae), cheetah (*Acinonyx*), lion (*Panthera*), saber-toothed cat (*Smilodon*), capybara (*Hydrochoerus*), dire wolf (*Canis dirus*), and numerous taxa of smaller mammals (Rodentia) (Blake, 1991; Jahns, 1954; Jefferson, 1991). The PBDB (2018) contains records for Pleistocene-aged fossil localities from older alluvium/Palos Verdes Sand deposits within 10 miles of the Project area, including coral (*Caryophyllia californica*), gastropod (*Acanthina* sp.), crab (*Pyromaia tuberculata*), fish (*Alisea grandis*, Osteichthyes), seal (*Mirounga angustirostris* and Pinnipedia), sea lion (*Eumetopias* sp.), dolphin (Delphinidae), whale (Cetacea), tapir (*Tapirus* [*Helicotapirus*] *haysii*), mammoth (*Mammuthus primigenius*), as well as numerous other invertebrate and vertebrate fossil taxa from similar geologic units throughout Los Angeles County. Additionally, MioMap contains numerous records of vertebrate fossils recovered from older alluvium deposited during the Sangamon Interglacial Stage, including fish (Pisces); amphibian (Lissamphibia); reptile (Reptilia); bird (Aves); rodents, such as pocket gopher (*Thomomys bottae*), vole (*Microtus californicus* cf.), woodrat (*Neotoma fuscipes* cf.), and ground squirrel (*Spermophilus beecheyi*); rabbit, such as hare (*Lepus* sp.) and brush rabbit (*Sylvilagus bachmani* cf); ground sloth (*Megalonyx* sp. and *Nothrotheriops shastensis* cf.); mammoth (*Mammuthus* sp.); horse (*Equus* sp.); pronghorn (*Capromeryx* sp.); bison (*Bison latifrons* cf. and *Bison* sp.); camel (*Camelops hesternus* cf.); deer (*Odocoileus hemionus* cf.); dolphin (Delphinidae); whale (Cetacea); sea lion (*Zalophus californicus*); sea otter (*Enhydra lutris* cf.); dire wolf (*Canis dirus* cf.); and feline, such as the American lion (*Panthera atrox* cf.), mountain lion (*Puma concolor* cf.); and saber-toothed cat (*Smilodon fatalis*) (Carrasco et al., 2005). Additionally, MioMap contains records of fossil vertebrates from the Wisconsin Glacial Stage, including mole (*Scapanus* sp.); rodents, such as vole (*Microtus* sp.) and others (Geomyidae and Muridae); rabbt (Leporidae); tapir (*Tapirus californicus* cf.); horse (*Equus* sp.); and deer (*Odocoileus* sp.) (Carrasco et al., 2005). The UCMP (2018) online fossil locality database contains numerous records of Pleistocene-aged localities within the vicinity of the Project area and Los Angeles County, including crab (Malacostraca, *Grapsidus* sp., *Speocarcinus californiensis*, *Portunus xanthusii*, *Cancer productus*, *Cancer gracilis*, *Cancer anthonyi*, *Hemigrapsus nudus*, *Callinectes bellicosus*, *Callinectes arcuatus*, and *Callianassa* sp.); shark (Chondrichthyes), such as six-gilled shark (*Hexanchus* sp.), great white shark (*Carcharodon* sp.), and requiem shark (*Carcharhinus* sp.); ray (*Urolophus* sp., *Myliobatis* sp.); bony fish (Osteichthyes), such as stickleback (*Gasterosteus aculeatus*); amphibian (Amphibia), such as frog (*Rana* sp.), toad (*Bufo* sp.), and newt (*Taricha* sp.); reptiles (Reptilia), such as rattlesnake (*Crotalus* sp. and *C. viridis*), pine snake (*Pituophis melanoleucus*), king snake (*Lampropeltis getula*), aquatic turtle (*Clemmys* sp. and *Actinemys marmorata*); birds (Aves), such as loon (*Gavia artica*, *Gavia immer*), cormorant (*Phalacrocorax auritas*, *Phalacrocorax penicillatus*), vulture (*Cathartes aura*, *Coragyps* sp.), sea duck (*Bucephala albeola*, *Melanitta perspicillata*), goose (*Chendytes lawi*, *Branta canadensis*, *Anser albifrons*), grebe (*Podiceps auritus*, *Aechmophorus occidentalis*), duck (*Anas americana*, *Anas clypeata*, *Anas crecca*, *Anas platyrhynchos*, *Histrionicus carolinensis*), albatross (*Diomedea nigripes*), lark (*Sturnella neglecta*), coot (*Fulica americana*), quail (*Callipepla californica*), puffin (*Puffinus opisthomelas*, *Puffin griseus*, *Puffin opisthomelas*), murrelet (*Synthliboramphus antiquus*, *Synthliboramphus* sp.), sandpiper (*Tringa* sp.), scoter (*Melanitta deglandi*, *Melanitta perspicillata*), auklet (*Ptychoramphus aleuticus*), kestrel (*Falco sparverius*), gull (*Larus glaucescens*), and quail (*Callipepla californica*); mammal (Mammalia), including pocket gopher (*Thomomys bottae*), vole (*Microtus californicus* cf.), woodrat (*Neotoma fuscipes* cf.), ground squirrel (*Spermophilus beecheyi*), hare (*Lepus* sp.), brush rabbit (*Sylvilagus bachmani* cf.), ground sloth (*Megalonyx* sp. and *Nothrotheriops shastensis*.), mammoth (*Mammuthus* sp.), horse (*Equus* sp.), pronghorn (*Capromeryx* sp.), bison (*Bison latifrons* cf. and *Bison* sp.), camel (*Camelops*); deer (*Odocoileus hemionus*), sea lion (*Zalophus*), sea otter (*Enhydra lutris*), dire wolf (*Canis dirus*); and feline, such as mountain lion (*Felis concolor* cf.) and saber-toothed cat (*Smilodon floridanus*); and plants (*Pinus remorata*).

Therefore, Pleistocene-aged older alluvium/Palos Verdes Sand has a high paleontological potential (PFYC 4).

5.1.1.4 Landslide Debris/Slough (Qls)

Dibblee et al. (1999) mapped Holocene-aged to late Pleistocene-aged landslide debris (Qls) throughout the vicinity of the Project area, and Geocon West (2017) noted several slough deposits along the southern portion of the Project area, abutted against the base of the north-facing slope of the large rock cliff face. According to Dibblee et al. (1999), the landslide debris consists of eroded sediments of the Monterey Formation. Landslide debris/slough deposits are unlikely to yield scientifically significant fossils due to the mechanisms in which they form. Thus, these deposits have a low potential for paleontological resources (PFYC 2).

5.1.1.5 Artificial Fill

Throughout the entirety of the Project area, except for atop the large north-facing rock cliff face, most of the Project area is overlain by Recent artificial fill (af) and debris, ranging in thickness across the site. KHR Associates (2018) generally mapped artificial fill across the site but did not provide well-defined boundaries; thus, it is not included on the geologic map in Attachment A (Figure 3). Depths of artificial fill range from 2 to 75 feet below the existing ground surface. According to the geotechnical investigation, fill is shallowest near the base of the adjacent slopes and increases in thickness towards the central portion of the central basin (Geocon West, 2017). The artificial fill is a product of back-filling the existing mining pit; thus, it contains light to dark brown and yellowish-brown sand, silty sand, and clayey sand, as well as traces of gravel, sandy silt, clay, concrete, brick, rock fragments, wire, PVC pipe, plastic, and metal debris (Dibblee et al., 1999; Geocon West, 2017).

Fossils discovered in Recent artificial fill (af) lack scientific context, and therefore, are generally not considered to be scientifically significant. Thus, Recent artificial fill and any previously disturbed sediments have low paleontological potential (PFYC 2).

5.1.2 Museum Records Search Results

Paleo Solutions requested a museum records search from LACM on August 28, 2018 and were sent the results of the records search on September 4, 2018 (McLeod, 2018). According to the museum records search, one fossil locality has been recorded from within the bounds of the Project area. Fossil locality LACM 4319 was recorded from sediments of the terrestrial Palos Verdes Sand and interfingering marine San Pedro Sand and yielded specimens of fossil camel (Camelidae) associated with great white shark (*Carcharodon* sp.) and requiem shark (*Carcharhinus* sp.) (McLeod, 2018).

On the southern slope of the southern ridge within and immediately south of the Project area, fossil locality LACM 5084 yielded specimens of bonito shark (*Isurus* sp.) from either a marine bed of the Palos Verdes Sand or the San Pedro Sand (McLeod, 2018). Additionally, immediately north of the western-most portion of the Project area, fossil locality LACM 4424 yielded a fossil specimen of sanddab fish (*Citharichthys* sp.) from the Palos Verdes Sand and/or San Pedro Sand, and further southeast of the Project area, south of Winlock Road, fossil locality LACM 3265 yielded fossil specimens of mastodon (*Mammut* sp.) and whale (Cetacea) from the Palos Verdes Sand and/or San Pedro Sand (McLeod, 2018).

5.2 FIELD RECONNAISSANCE

Paleo Solutions' Senior Paleontologist Mathew Carson, M.S., conducted a field reconnaissance survey of the Project area on September 4, 2018. The terrain consisted of high topographic relief, with a north-sloping, large rock cliff face along the southern Project area boundary, a relatively smaller ridge along the northwestern boundary, and the smallest ridge along the northeastern portion of the Project area, which contains a relatively flat pad and dirt access road (Figure 4). The central portion of the Project area consisted of a shallow basin, covered in overgrown vegetation, trash and debris, and artificial fill derived from local sediments (Figure 5).

During the survey, the Monterey Formation widely exposed on the southern north-facing rock face was assessed (Figure 6). Exposures of the Monterey Formation consisted of buff-, tan-, light brown-, and grayish-brown-colored diatomaceous and siliceous fine-grained to coarse-grained sandstone and siltstone, moderately to well lithified yet porous, moderately sorted, with beds dipping steeply as much as 80 degrees north towards the central basin. During the survey, small, high-spired gastropod fossil shells and shell hash were observed in the south-southeastern portion of the exposed rock face; however, these fossils may be from weathered sediments of the Lomita Marl of the lower San Pedro Sand discussed by Geocon West (2017) (Figure 7). The base of the rock face was covered significantly by landslide debris and slough deposits, composed of buff to brown, coarse-grained sand and silt, with sparse granules and pebbles, as well as thick vegetation (Figure 8).

Small exposures of the San Pedro Sand were observed along the north-northwestern ridge. Immediately north, one small outcrop half-way up the hillside contains exposed sediments of the San Pedro Sand consisting of tan to light brown siltstone, well sorted, friable, thinly bedded with no internal sedimentary structures, and moderately cemented (Figure 9). At the northwestern portion of the Project area, a small exposure of buff to gray colored, poorly cemented to loose, moderately to well sorted, subangular to subrounded sand that contained shell hash and bivalve and gastropod shells common to the San Pedro Sand (Figures 10 and 11). Underlying the loose sand, was a layer of unknown thickness of well rounded cobbles of other siliceous and diatomaceous rocks, presumably derived from the Monterey Formation.

Outcrops of the Palos Verdes Sand were observed within a drainage along the northeastern ridge of the Project area and consisted of dark brown to reddish-brown pebble-gravel and very coarse-grained sand, poorly sorted, subrounded to well rounded, and well lithified (Figure 12). Underlying the pebble-gravel layers were light to medium brown, moderately lithified, massive coarse-grained sand that may belong to the upper-most layers of the San Pedro Sand (Figure 13).

No significant fossil localities or nonsignificant fossil occurrences were recorded during the survey; however, fossil shell hash and intact bivalves and gastropods, although common, indicate the presence of fossil material within these geologic units.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis of existing data, the paleontological potential was assessed using the BLM PFYC system (BLM, 2008; 2016). Middle to Late Miocene-aged Monterey Formation has a very high potential (PFYC 5) to yield scientifically significant fossil resources. Although Project-related ground disturbances are not anticipated to impact the Monterey Formation at depth during grading (cut and fill) operations of the central, northwestern, and northeastern portions of the Project area, Project-related disturbances near the north-sloping cliff face may impact the Monterey Formation near the surface. If Project-related excavations impact the Monterey Formation, then full-time monitoring is required. Pleistocene-aged San Pedro Sand has a high potential (PFYC 4) to yield scientifically significant fossil resources based on the results of the museum records search and field reconnaissance. Therefore, full-time monitoring is required in native, previously undisturbed sediments of the San Pedro Sand. Additionally, the Pleistocene-aged Palos Verdes Sand has a high potential (PFYC 4) to yield scientifically significant fossil resources based on the results of the museum records search; however, the field reconnaissance indicates that these deposits are very coarse-grained, which is generally not conductive to fossil preservation. The Palos Verdes Sand should initially be monitored full-time to determine if native sediments likely to preserve fossils will be impacted during Project-related excavations. If not, then monitoring should be reduced or halted at the discretion of the Project Paleontologist in consultation with the City of Torrance. Because of the variable depth of artificial fill, Project-related ground disturbances in artificial fill (PFYC 2) should be spot-checked to determine the depth to the underlying native, previously undisturbed geologic units (i.e., the Palos Verdes Sand or the San Pedro Sand). Landslide and slough deposits also have a low paleontological potential (PFYC 2); thus, they do not require paleontological monitoring. A Paleontological Monitoring Plan (PMP) should be prepared by a qualified Paleontologist to determine the level of monitoring needed during Project-related excavations and will conform to CEQA, local regulations, and best practices in mitigation paleontology (Murphey et al., 2014).

Sincerely,

Mathew Carson, M.S.
Assistant Project Manager, Paleo Solutions

Attachments:

Attachment A Figures
Attachment B Records Search Results

References:

Arnold, D., and Arnold, R., 1902, The marine Pliocene and Pleistocene stratigraphy of the coast of southern California: Journal of Geology, v. 10, p. 117-138.

Behl, R.J. 1999. Since Bramlette (1946): The Miocene Monterey Formation of California revisited. Classic Cordilleran Concepts: A View from California: Geological Society of America, Special Paper 338: 301-313 p.

Blake, W.P. 1856. Notice of remarkable strata containing the remains of Infusoria and Polythalmis in the Tertiary formation of Monterey, California: Philadelphia Acad. Nat. Science, Proc., v. 7, 328-331 p.

Blake, G.H. 1991. Review of the Neogene Biostratigraphy and Stratigraphy of the Los Angeles Basin and Implications for Basin Evolution: in Biddle, K.T., ed., Active Margin Basins. American Association of Petroleum Geologists, Memoir 52, Chapter 4, p. 135-184.

Bramlette, M.N. 1946. The Monterey Formation of California and the origin of its siliceous rocks, U.S. Geological Survey Professional Paper 212, 61-65 p.

Bureau of Land Management (BLM). 2008. Assessment and Mitigation of Potential Impacts to Paleontological Resources: BLM Instruction Memorandum No. 2009-011.

Bureau of Land Management (BLM). 2016. Potential Fossil Yield Classification system: BLM Instruction Memorandum No. 2016-124 (PFYC revised from USFS, 2008).

Carrasco, M.A., Kraatz, B.P., Davis, E.B., and Barnosky, A.D., 2005, Miocene Mammal Mapping Project (MioMap): University of California Museum of Paleontology, viewed April 3, 2018. Available at: http://www.ucmp.berkeley.edu/miomap/

City of Torrance. 2009. City of Torrance General Plan, available at: https://www.torranceca.gov/our-city/community-development/general-plan/plan-2009

Dibblee, T.W., Jr, Ehrenspeck, H.E., Ehlig, P.L., Bartlett, W.L., and Minch, J.A., 1999, Geologic map of the Palos Verdes Peninsula and Vicinity: Redondo Beach, Torrance, and San Pedro Quadrangles, Los Angeles County, California: Dibblee Foundation Map DF-70, scale 1:24,000.

Fitch, J.E., 1967, The marine fish fauna, based primarily on otoliths, of a lower Pleistocene deposit at San Pedro, California (LACMIP 332, San Pedro Sand): Contributions in Science, v. 128, p. 1-23.

Geocon West, Inc., 2016, Fault Rupture Hazard Investigation for the Proposed Multi-Family Residential Development Hawthorne Boulevard and Via Valmonte, Torrance, California: Prepared for MKS Residential, Solana Beach, California, p. 41.

Geocon West, Inc., 2017, Preliminary Geotechnical Investigation for the Proposed Multi-Family Residential Development Hawthorne Boulevard and Via Valmonte, Torrance, California: Prepared for Reylenn Properties, LLC, Solana Beach, California, p. 341.

Howard, H., 1948, Later Cenozoic avian fossils from near Newport Bay, Orange County, California: Abstracts with Programs, Geologic Society of America, v. 59, p. 1372-1373.

Jacobs, S.E., 2005, Palos Verdes Peninsula: Survivors of the world's richest collection of Pleistocene marine invertebrate fossils: Abstracts with Programs, Geologic Society of America, v. 37, no. 4, p. 62.

Jacobs, S.E., Edward, M., and Brown, A.R., 2000, 'Fossil hash'; a late Pleistocene tsunami deposit at 2nd Street, San Pedro, California: Abstracts with Programs, Geologic Society of America, v. 33, no. 3, p. 54.

Jahns, R.H. 1954. Geology of Southern California. State of California, Department of Natural Resources, Bulletin 170, Volume 1.

Jefferson, G.T. 1991. A Catalogue of Late Quaternary Vertebrates from California: Part two, Mammals. Natural History Museum of Los Angeles, Technical Report #7.

KHR Associates, 2018, Geological Map Overlay Reference Exhibit, Torrance, California. Last modified July 17, 2018.

McLeod, S.A., 2018, Paleontological resources for the proposed Solana Torrance Project, in the City of Torrance, Los Angeles County, project area, dated September 4, 2018, 2 p.

Miller, L., 1930, Further bird remains from the upper San Pedro Pleistocene: The Condor, v. 32, p. 116-118.

Murphey, P.C., Knauss, G.E., Fisk, L.H., Demere, T.A., Reynolds, R.E., Trujillo, K.C., and Strauss, J.J., 2014, A foundation for best practices in mitigation paleontology: Proceedings of the 10th Conference on Fossil Resources: Dakoterra, v. 6, p. 243-285.

Norris, R.M., and Webb, R.W., 1990, Geology of California, 2nd Edition, John Wiley & Sons, In., N.Y., 571 p.

Oldroyd, T.S., 1924, The fossils of the lower San Pedro fauna of the Nob Hill cut, San Pedro, California: Proceedings of the National Museum, v. 65, no. 22, 36 p.

Paleobiology Database (PBDB), 2018, Database Search, accessed September 4, 2018. Available online here: https://paleobiodb.org/

Scott, E., and Springer, K., 2003, CEQA and Fossil Preservation in California: The Environmental Monitor, Association of Environmental Professionals (AEP), 10 p.

University of California Museum of Paleontology (UCMP), 2018, Fossil Locality Database Search, accessed September 4, 2018. Available here: https://ucmpdb.berkeley.edu/

Walsh, S.L., 1996, Middle Eocene mammal faunas of San Diego County, California, *in* Prothero, D.R., Emry R.J., eds, The Terrestrial Ecoene-Oligocene Transition in North America: Cambridge University Press.

Woodring, W.P., 1952, Pliocene-Pleistocene Boundary in California Coast Ranges: American Journal of Science, v. 250, p. 401-410.

Woodring, W.P., Bramlette, M.N., and Kew, W.S., 1946, Geology and paleontology of Palos Verdes Hills, California: Geological Survey Professional Paper 207, 125 p.

ATTACHMENT A
Figures

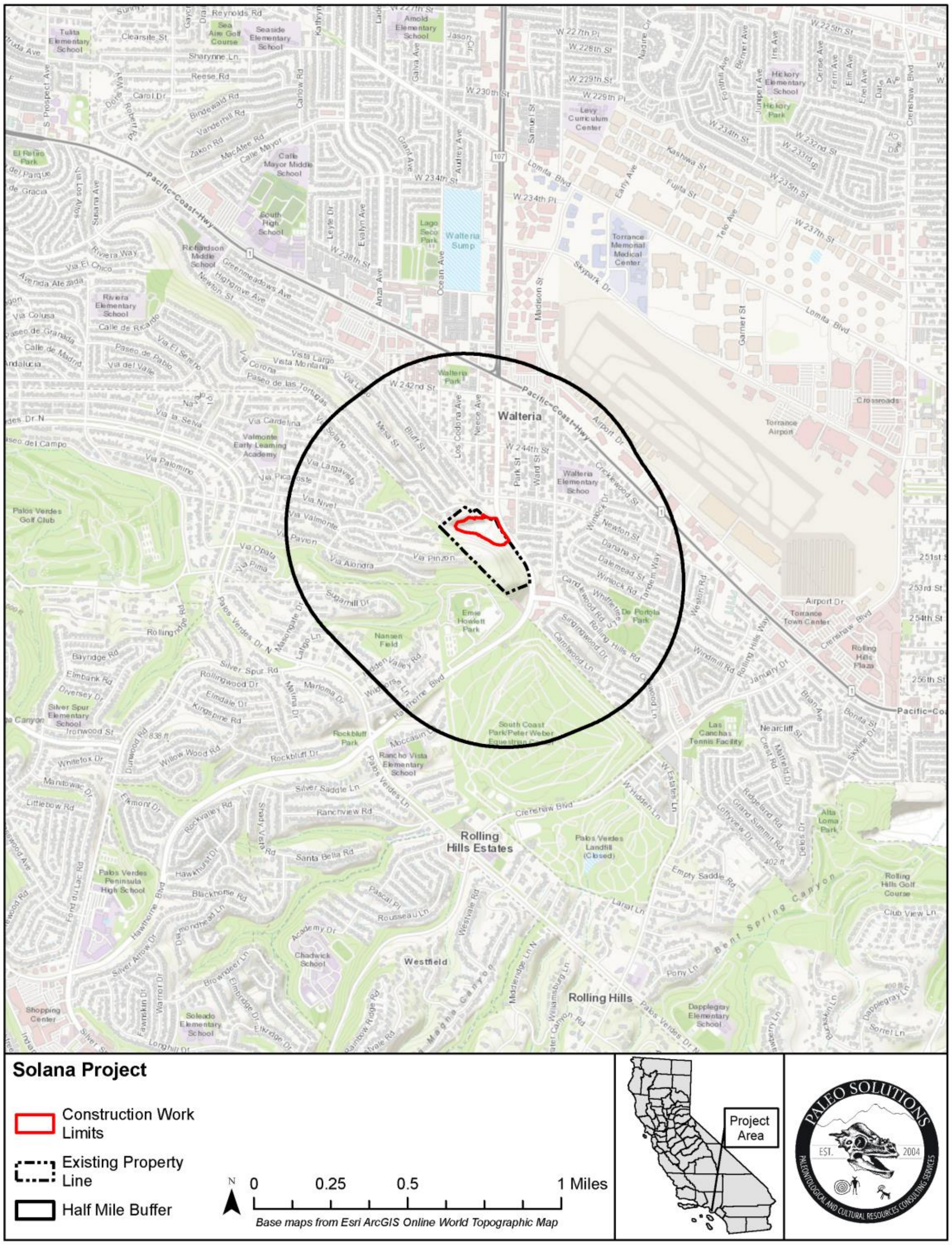

Figure 1. Project vicinity.

Figure 2. Project location.

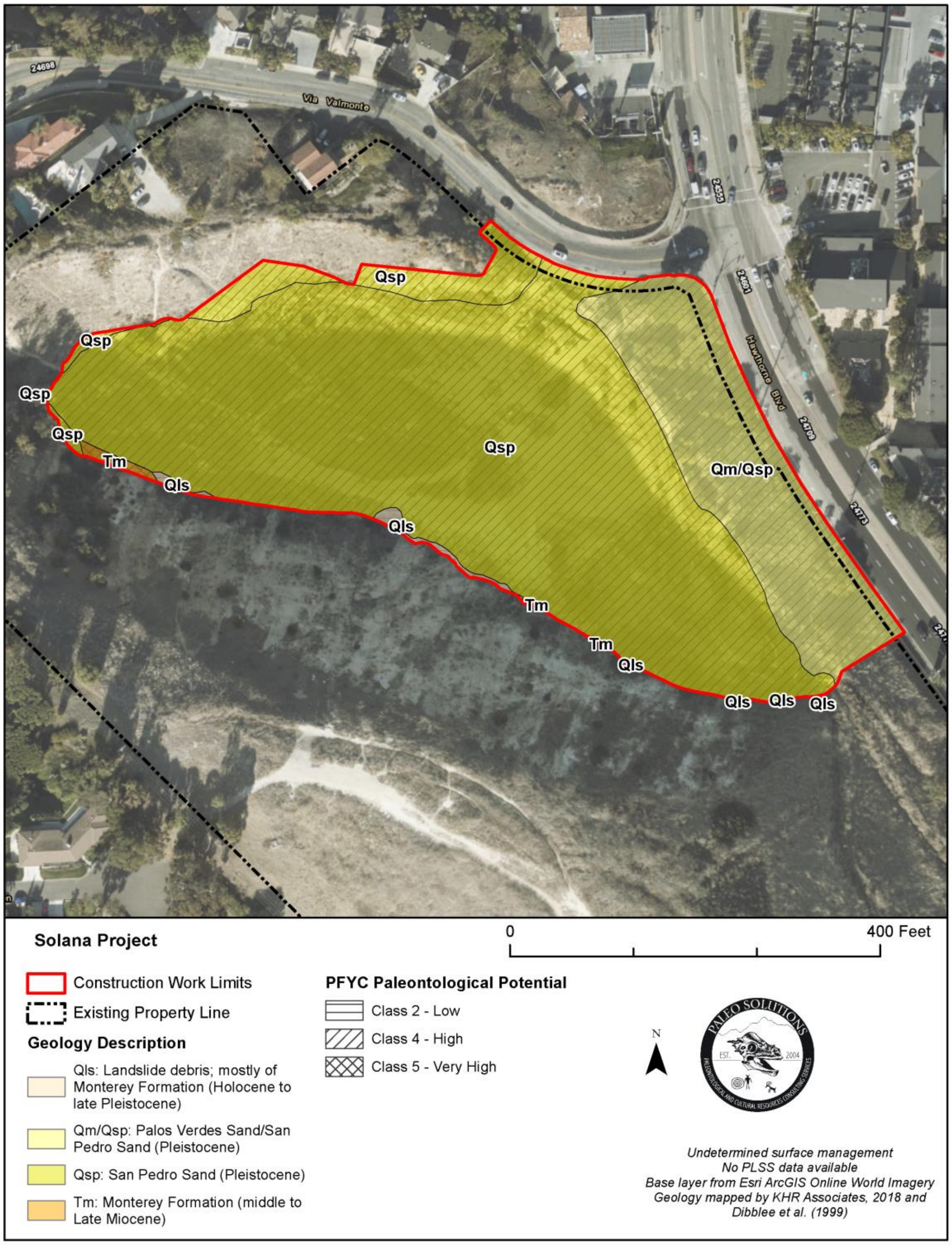

Figure 3. Geologic map.

Figure 4. Overview of the Project area, showing large Monterey Formation rock face to the right, the northwestern ridge with San Pedro Sand exposures in the background, and artificial fill covering San Pedro Sand in the central basin foreground. View towards the northwest.

Figure 5. Overview of Project area within the central basin, showing artificial fill, debris, and the northern ridge in the background. View towards the north.

Figure 6. Overview of the north-sloping rock cliff face exposing the Monterey Formation; landslide debris and slough deposits can be seen in the far right of the photo. View towards the southwest.

Figure 7. Fossil gastropod shells and shell hash observed in weathered sediments of the Monterey Formation near the base of the rock face; these shells may also be from the Lomita Marl of the San Pedro Sand.

Figure 8. Landslide debris and slough deposits from near the bottom of the north-facing rock cliff face, showing poorly sorted sediments of weathered Monterey Formation.

Figure 9. Rock exposure of bedded, friable, well-sorted siltstone of the San Pedro Sand, located along the northern-most ridge.

Figure 10. Weathered sediments along the northwestern ridge composed of buff colored, loose sand of the San Pedro Sand, which overlies a bed of poorly sorted, well-rounded cobbles. Loose sand contains numerous shell fragments and shell hash. View towards the west.

Figure 11. Weathered sediments of the San Pedro Sand along the northwestern ridge containing numerous shell fragments, bivalves, gastropods, and unidentifiable shell hash.

Figure 12. Exposure of the Palos Verdes Sand, exposed along the northeastern ridge along a drainage path that drains from the pad along the access road. Note the coarse-grained sand and pebble-gravel overlying finer-grained, well sorted sand of the San Pedro Sand. View towards the east.

Figure 13. Close-up view of the Palos Verdes Sand exposure along the northeastern ridge.

ATTACHMENT B
Records Search Results

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

4 September 2018

Paleo Solutions, Inc.
911 South Primrose Avenue, Unit N
Monrovia, CA 91016

Attn: Barbara Webster, GIS Specialist & Archaeologist

re: Paleontological resources for the proposed Solana Torrance Project, in the City of Torrance, Los Angeles County, project area

Dear Barbara:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Solana Torrance Project, in the City of Torrance, Los Angeles County, project area as outlined on the portion of the Torrance USGS topographic quadrangle map that you sent to me via e-mail on 28 August 2018. We have one vertebrate fossil locality that occurs directly within the proposed project area boundaries, and we have other localities nearby from the sedimentary deposits similar to some of those that occur in the proposed project area.

For most of the proposed project area there are surface deposits of the late Pleistocene Palos Verdes Sand. In the southeastern portion of the proposed project area there are exposures of the slightly older Pleistocene deposits of the marine San Pedro Sand. These deposits intermingle so that we find terrestrial and marine fossils at the same locality. We have one vertebrate fossil from these deposits, LACM 4319, that occurs that occurs directly within the proposed project area boundaries. Locality LACM 4319 produced a specimen of fossil camel, Camelidae, in association with great white shark, *Carcharodon*, and requiem shark, *Carcharhinus*.

On the south facing slope of the ridge immediately south of the proposed project area our locality LACM 5084 from these deposits produced a fossil specimen of bonito shark, *Isurus*. Just north of the western-most portion of the proposed project area our Pleistocene locality LACM 4424 produced a fossil specimen of sanddab, *Citharichthys*. Further southeast of the proposed project area, south of Winlock Road, from the Torrance Sand & Gravel Pit [later known as the Chandler Company West Pit], our locality LACM 3265 from these deposits produced fossil specimens of mastodon, *Mammut*, as well as undetermined whale, Cetacea.

Any excavations in the exposures of the Palos Verdes Sand or the San Pedro Sand in the proposed project area may well encounter significant vertebrate fossils. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice