PALEONTOLOGICAL RESOURCES REPORT FOR THE SUPERIOR AVENUE PEDESTRIAN AND BICYCLE BRIDGE AND PARKING LOT PROJECT, NEWPORT BEACH, CALIFORNIA

Prepared for:

Andy Tran, P.E.
Senior Civil Engineer
City of Newport Beach
100 Civic Center Drive
Newport Beach, CA 92660

Prepared by:

Kyle Knabb, PhD, RPA
Ted Roberts, MA, RPA
Joe Stewart, PhD
CHAMBERS GROUP, INC.
5 Hutton Centre Drive, Suite 750
Santa Ana, California 92707
(949) 261-5414

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SECTION 1.0 – MANAGEMENT SUMMARY

Purpose and Scope

Chambers Group was retained by the City of Newport Beach to conduct paleontological resource services for the Superior Avenue Pedestrian and Bicycle Bridge and Parking Lot Project located in the City of Brawley, Imperial County, California. The scope of services included (1) a paleontological records search and (2) the preparation of this technical report of findings and recommended mitigation measures.

Dates of Investigation

The records search was performed on June 3, 2019. This technical report was completed in July 2019.

Results of the Investigation

According to published geological reports by Morton and Miller (2006), project area is underlain by Middle to Late Pleistocene-age old paralic deposits and the middle to late Miocene-age Monterey Formation. Museum collection records maintained by the San Diego Natural History Museum (SDNHM) indicate that three fossil localities have been recorded within one mile of the study area (San Diego Natural History Museum 2019).

The results of the literature review indicate that both geological units underlying the project area are determined to have high paleontological sensitivity. That is, the current project area contains an above average potential for paleontological resources. Therefore, any project-related ground disturbances may result in an adverse impact to non-renewable fossil resources unless proper mitigation measures are implemented.

Recommendations

Chambers Group recommends that a qualified paleontologist be retained to design and implement a paleontological resource mitigation plan during any ground disturbing activities related to the proposed development within the project area. All fossils recovered during the paleontological monitoring and mitigation program should be prepared, stabilized, identified, and permanently curated in an approved repository or museum (such as the SDNHM).

Disposition of Data

This report will be filed with the City of Newport Beach. A copy will be retained at Chambers Group along with maps and all other records relating to the project.

SECTION 2.0 – INTRODUCTION

This report presents the findings of a paleontological literature review and museum records search conducted for the City of Newport Beach, California. This study evaluates the paleontological sensitivity of the project area and vicinity, assesses potential project related impacts on paleontological resources, and provides recommendations for project specific mitigation measures. This study was conducted in accordance with the professional guidelines established by the Society of Vertebrate Paleontology (SVP) (2010).

2.1 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry and physics to understand the history of life on Earth. Paleontological resources, or fossils, are the remains, imprints or traces of once-living organisms preserved in sedimentary rocks. Fossils include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. The fossil record is the only direct evidence that life on Earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are utilized to:

- Study the evolutionary relationships between extinct organisms, as well as their relationships to modern groups.
- Elucidate the taphonomic, behavioral, temporal and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record.
- Reconstruct ancient environments, climate change, and paleoecological relationships.
- Provide a measure of relative geologic dating which forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for radiometric dating.
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time.
- Study patterns and processes of evolution, extinction and speciation.
- Identify past and potential future human-caused effects to global environments and climates.

SECTION 3.0 – PROJECT DESCRIPTION

3.1 PROJECT DESCRIPTION

Chambers Group has been contracted by the City of Newport Beach to complete a paleontological literature review and museum records search for the Superior Avenue Pedestrian and Bicycle Bridge and Parking Lot Project, which includes the construction of a pedestrian and bicycle bridge spanning Superior Avenue to connect a new, larger parking lot to Sunset Ridge Park, an existing 13.7-acre active park with baseball and soccer fields. The new asphalt parking lot will be located at the corner of West Coast Highway and Superior Avenue. In addition, the City proposes the construction of a fenced dog park adjacent to the new parking lot. The purpose of this investigation is to assess the potential for significant paleontological deposits and/or materials within the proposed project area.

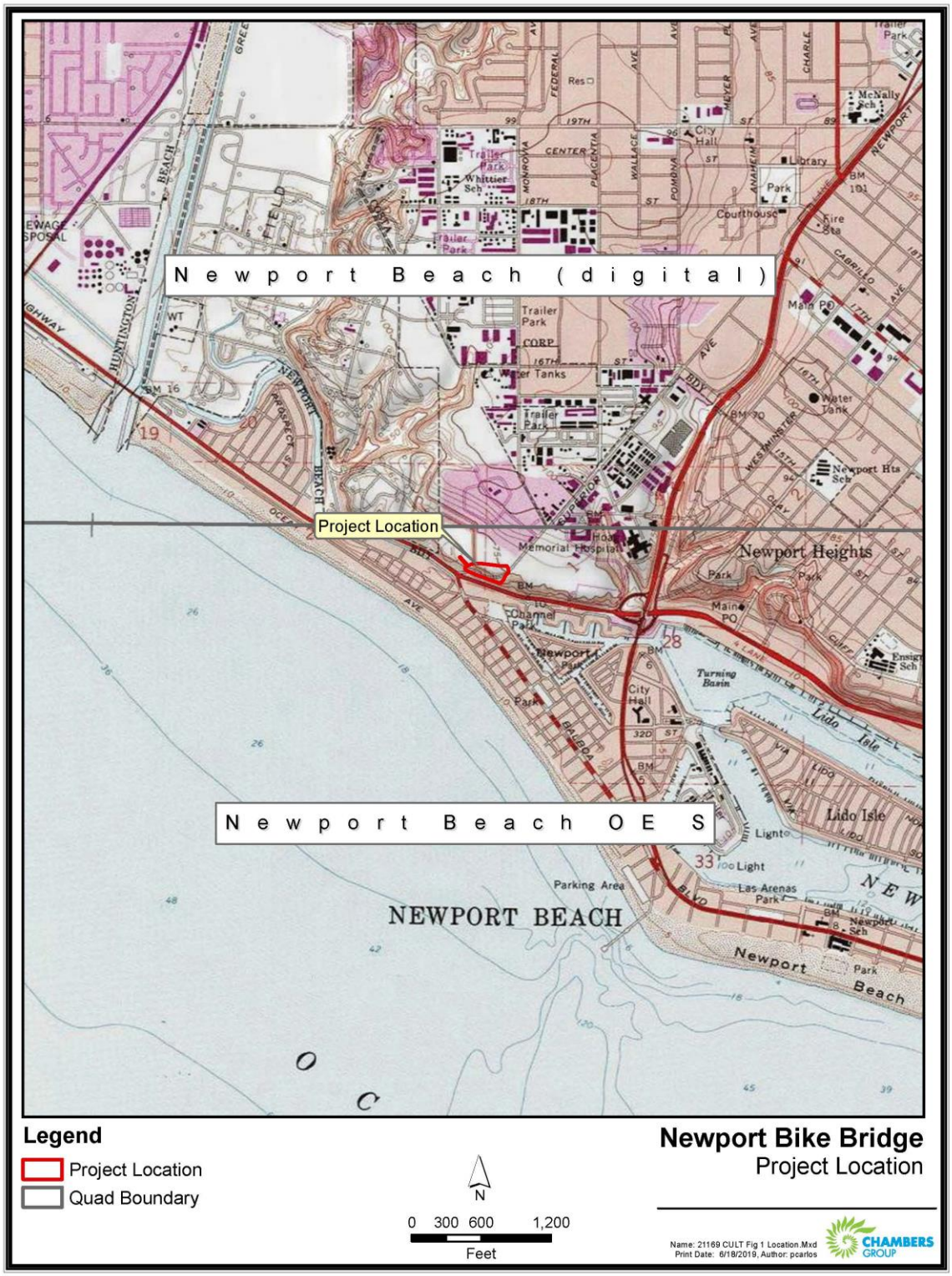
3.2 PROJECT LOCATION

The project area is located within the City of Newport Beach, Orange County, California. The approx. 3.4 acre project area is located on the corner of West Coast Highway and Superior Avenue. The parcel is bordered on the north by Superior Avenue, to the south by West Coast Highway, to the west by the existing Sunset View Park, and to the east by Hoag Hospital. Specifically, the project area is located on the U.S. Geological Survey (USGS) Newport Beach OES 7.5-minute quadrangle (Figure 1-2).

Regional access to the project area is provided via West Coast Highway, City of Newport Beach, Orange County, California.

Figure 1: Project Vicinity

Figure 2: Project Location



SECTION 4.0 – RESOURCE ASSESSMENT GUIDELINES

Paleontological resources are limited, non-renewable resources of scientific, cultural, and education value and are afforded protection under federal (National Environmental Policy Act, or NEPA), state (California Environmental Quality Act, or CEQA), and local (Imperial County) laws and regulations. This study satisfies project requirements in accordance with CEQA (13 Public Resources Code [PRC] 2100 et seq.) and Public Resources Code § 5097.5. This analysis also complies with guidelines and significance criteria specified by the SVP (2010) and Imperial County.

4.1 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Fossils are classified as non-renewable scientific resources and are protected by various laws, ordinances, regulations, and standards (LORS) across the country. The SVP (2010) has established professional standards for the assessment and mitigation of adverse impacts to paleontological resources. This paleontological assessment was conducted in accordance with the LORS that are applicable to paleontological resources within the proposed project area.

4.1.1 State Requirements

California state laws and regulations under the California Environmental Quality Act (CEQA) and Public Resources Code (PRC) Section 5097.5 apply to paleontological resources and the proposed Project.

California Environmental Quality Act

Guidelines for the Implementation of CEQA (Title 14, Chapter 3, California Code of Regulations (CCR) 15000 et seq.) define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include as one of the questions to be answered in the Environmental Checklist (CEQA Appendix G, Section VII, Part f) the following: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?"

Public Resources Code Section 5097.5

Section 5097.5 of the California Public Code Section protects historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological sites, or any other archaeological, paleontological, or historical feature that is situated on land owned by, or in the jurisdiction of, the State of California, or any city, county, district, authority, or public corporation, or any agency thereof.

4.1.2 Local Requirements

The City of Newport Beach has adopted paleontological guidelines (Policy # K-4, adopted on August 26, 1974, amended on January 24, 1994, and corrected on March 22, 1999) which govern the identification and evaluation of these resources and are used to guide the development or redevelopment of lands within the City. The following discussion is adapted from the City Council Policy Manual guidelines.

1. The City shall, through its planning policies and permit conditions, ensure the preservation of paleontological resources and require that the impact caused by any development be mitigated in accordance with CEQA.

2. The City shall prepare and maintain sources of information regarding paleontological sites and the names and addresses of responsible organizations and qualified individuals who can analyze, classify, record, and preserve paleontological findings.

3. If determined to be necessary by the Planning Director, it shall be the responsibility of a landowner or developer prior to the commencement of land development to cause the proposed site to be examined to determine the existence and extent of paleontological resources. The examination shall be by qualified observers approved by the City. The observers shall prepare and submit to the City a written report describing findings and making recommendations for further action. The report shall discuss both positive and negative aspects of the effects of the proposed development on paleontological resources. The report shall be considered part of the CEQA review process and, if appropriate, the recommendations shall be included as mitigation measures and conditions of approval for the Project.

4. Based on the report and recommendations of the observers, the City shall take such steps as are necessary to assure that any findings or sites are recorded, preserved, and protected. These steps may include requirements that the landowner or developers incur reasonable expenditures of time or money, encouragement for appropriate volunteer or non-profit organizations to become involved, or acquisition of the sites by public or private agencies. Provisions shall be made for the deposition of scientifically valuable paleontological materials removed from the site with responsible public or private institutions. In all cases, the City shall seek responsible scientific advice and make the necessary decisions consistent with the public interest.

4.1.3 Professional Standards

Although CEQA requires that projects be evaluated and recommendations be made to mitigate any impacts if they exist (CEQA Guidelines, Appendix G), it does not specify how to identify, evaluate, or mitigate the resource. Therefore, other sources must be consulted as part of this process. The primary source of information comes from the Society of Vertebrate Paleontologists (SVP) Guidelines (2010).

The SVP has established standard guidelines (SVP 2010) that outline professional protocols and practices for the conducting of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most state regulatory agencies with paleontological LORS accept and utilize the professional standards set forth by the SVP.

As defined by the SVP (2010:11) significant paleontological resources are defined as:

> *fossils and fossiliferous deposits… consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).*

Based on the significance definitions of the SVP (2010), all identifiable vertebrate fossils are considered to have significant scientific value because vertebrate fossils are relatively uncommon, and because only rarely will a fossil locality yield a statistically significant number of specimens of the same genus.

Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment, and/or its distribution. Furthermore, all geological units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by project paleontologists, specialists, or local government agencies.

A geologic unit known to contain significant fossils is considered "sensitive" to adverse impacts if earth moving or ground-disturbing activities in that rock unit could likely disturb or destroy fossil remains directly or indirectly. This definition of sensitivity differs fundamentally from that for archaeological resources as follows:

> *It is extremely important to distinguish between archaeological and paleontological resources when discussing the paleontological potential of rock units. The boundaries of an archaeological resource site define the areal/geographic extent of an archaeological resource, which is generally independent from the rock unit on which it sits. However, paleontological sites indicate that the containing rock unit or formation is fossiliferous. Therefore, the limits of the entire rock unit, both areal and stratigraphic, define the extent of paleontological potential.*

Many archaeological sites contain features that are visually detectable on the surface. In contrast, fossils are contained within surficial sediments or within bedrock, and are therefore not observable or detectable unless exposed by erosion or human activity. In summary, paleontologists cannot know either the quality or quantity of fossils prior to natural erosion or human-caused exposure. As a result, even in the absence of surface fossils, it is necessary to access the sensitivity of rock units based on their known potential to produce significant fossils elsewhere within the same geologic unit (both within and outside of the study area), a similar geologic unit, or based on whether the unit in question was deposited in a type of environment that is known to be favorable for fossil preservation. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if these remains are significant, successful mitigation and salvage efforts may be undertaken to prevent adverse impacts to these resources.

4.1.4 Paleontological Potential

Paleontological potential is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological potential is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources," the SVP (2010:1-2) defines four categories of paleontological potential for rock units: high, low, undetermined, and no potential:

- **High Potential:** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and

sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

- **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
- **Undetermined Potential:** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
- **No Potential:** Some rock units have no potential to contain significant paleontological resources, for instance high grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

For geologic units with high potential, full-time monitoring is generally recommended during any project-related ground disturbance. For geologic units with low potential, protection or salvage efforts will not generally be required. For geologic units with undetermined potential, field surveys by a qualified vertebrate paleontologist should be conducted to specifically determine the paleontological potential of the rock units present within the study area.

SECTION 5.0 – METHODS

Due to the nature of the fossil record, paleontologists cannot know either the quality or the quantity of fossils present in a given geologic unit prior to natural erosion or human-caused exposure. Therefore, in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce scientifically significant fossils elsewhere within the same geologic unit (both within and outside of the study area) or a unit representative of the same depositional environment.

A detailed review of museum collections was performed by the Department of Paleontology and PaleoServices staff at the SDNHM for the purposes of (1) determining whether there are any known fossil localities in or near the project area, (2) identifying the geologic units present in the project area, and (3) determining the paleontological sensitivity ratings of those geologic units in order to assess potential impacts to nonrenewable paleontological resources.

In addition to the records search, published and unpublished literature and geologic maps were reviewed and mitigation measures specific to this project were developed in accordance with the SVP (2010).

No surface fossils were identified during the cultural resources pedestrian survey conducted on May 31, 2019 by Ted Roberts, M.A., RPA.

SECTION 6.0 – GEOLOGY AND PALEONTOLOGY

6.1 GEOLOGICAL SETTING

The proposed project is located at the northern end of the Peninsular Range geomorphic province, a 900-mile (mi) long northwest-southeast-trending structural block that extends from the tip of Baja California to the Transverse Ranges and includes the Los Angeles Basin (Norris and Webb, 1976). The total width of the province is approximately 225 mi, with a maximum landbound width of 65 mi (Sharp, 1976). It contains extensive pre-Cretaceous (> 65 million years ago) igneous and metamorphic rocks covered by limited exposures of post-Cretaceous sedimentary deposits (Figure 3).

Figure 3: Overview of Project Area, facing west.

6.2 GEOLOGIC UNITS UNDERLYING THE PROJECT AREA

Published geological reports (e.g., Morton and Miller, 2006) covering the Project area indicate that the proposed Project has the potential to impact middle to late Pleistocene-age old paralic deposits and the middle to late Miocene-age Monterey Formation. These geologic units and their paleontological potential are summarized below. The SDNHM has three (approximately equivalent) recorded fossil localities within

one mile of the Project site from Pleistocene-age marine terrace sands (discussed below under "old paralic deposits").

6.2.1 Old Paralic Deposits

Middle to late Pleistocene-age (approximately 781,000 to 11,000 years old) paralic deposits underlie the northeastern portion of the Project site. These deposits overlie the Monterey Formation over a marine abrasion platform, on top of which marine terrace sands were deposited. The SDNHM has three recorded fossil localities within a 1-mile radius of the Project site. Fossils were collected from approximately the same stratum exposed in gullies eroded into the bluffs on the north side of the Pacific Coast Highway, west of its intersection with Newport Boulevard. These localities yielded trace fossils (e.g., sponge borings in shell) and fossilized remains of nearshore marine invertebrates (e.g., encrusting colonial bryozoans, snails, oysters, scallops, clams, and tusk shells). Based on the diverse marine invertebrate and rare marine vertebrate remains recovered from these deposits nearby the Project site and elsewhere in coastal southern California, they are assigned a high paleontological potential (SVP, 2010).

6.2.2 Monterey Formation

The majority of the Project site is underlain by deep marine deposits of the middle to late Miocene-age (approximately 16 to 8 million years old) Monterey Formation. The SDNHM does not have any recorded fossil localities within a 1-mile radius of the Project site. More broadly, the Monterey Formation has produced extremely diverse assemblages of marine organisms ranging from microscopic diatoms and radiolarians to enormous sharks and baleen whales. The kinds of fossils found in the formation typically vary according to rock type, with diverse assemblages of diatoms, silicoflagellates, and radiolarians more characteristic of the siliceous shales and diatomites, and coccoliths, foraminiferans, sharks, rays, bony fish, sea birds, and marine mammals more characteristic of the phosphatic and calcareous mud shales. Well-preserved fossil remains of marine mammals, including pinnipeds, toothed whales, baleen whales, sea cows, and hippo-like desmostylians have also been recovered from diatomaceous strata of the Monterey Formation (Barnes, 1976). The Monterey Formation is, accordingly, assigned a high paleontological potential (SVP, 2010).

SECTION 7.0 – ANALYSIS AND RESULTS

7.1 RESOURCE ASSESSMENT SUMMARY

Geologic mapping by Morton and Miller (2006) was consulted to identify the specific geologic units underlying the proposed project area (Table 1). The following table summarizes these units and their known paleontological sensitivity ratings.

Table 1: Geologic Formations in the Project Area

Geologic Formation	Age	Fossils	Paleontological Sensitivity Potential	Monitoring Recommendation
Old paralic deposits	Middle to late Pleistocene	Invertebrates, vertebrates, trace	High	Full-time
Monterey Formation	Middle to late Miocene	Invertebrates, vertebrates, plants	High	Full-time

7.2 MUSEUM RECORDS SEARCH AND LITERATURE REVIEW

The Department of Paleontology and PaleoServices staff at the SDNHM performed a paleontological records search to locate fossil localities within an in the immediate vicinity of the project area. Museum records indicate that three vertebrate fossil localities have been documented within the study area. None are located within the project area.

Table 2: Fossil Localities in the Vicinity of the Project Area

Locality Number	Locality Name	Location	Elevation (ft)	Geologic Unit	Era	Period	Epoch
99	Newport Beach	Orange County, CA		Unnamed marine terrace deposits	Cenozoic	Quaternary	Late Pleistocene
190	Newport Beach	Orange County, CA	20	Unnamed marine terrace deposits	Cenozoic	Quaternary	Late Pleistocene
190A	Newport Beach	Orange County, CA		Unnamed marine terrace deposits	Cenozoic	Quaternary	Late Pleistocene

SECTION 8.0 – RECOMMENDED MITIGATION MEASURES

The destruction of fossils as a result of human-caused ground disturbance has a significant cumulative impact, as it makes biological records of ancient life permanently unavailable for study by scientists. Implementation of proper mitigation measures can, however, reduce the impacts to the paleontological resources to below the level of significance.

The following mitigation measures have been developed in accordance with the SVP (2010) standards and meet the paleontological requirements of CEQA. These mitigation measures have been used throughout California and have been demonstrated to be successful in protecting paleontological resources while allowing timely completion of construction.

A. All project-related ground disturbances that could potential impact the Monterey Formation and the Old Paralic Deposits will be monitored by a qualified paleontological monitor on a full-time basis, as these geologic units are determined to have a high paleontological sensitivity. Project-related excavations that occur in surficial younger alluvial deposits (not mapped in the current study area but existing in the vicinity) will be monitored on a part-time basis to ensure that underlying paleontologically sensitive sediments are not being impacted. Excavations exceeding 5 feet in depth in Quaternary alluvium will be monitored on a full-time basis.
B. A qualified paleontologist will be retained to supervise monitoring of construction excavations and to produce a Paleontological Monitoring and Mitigation Plan for the proposed project. Paleontological resource monitoring will include inspection of exposed rock units during active excavations within sensitive geologic sediments. The monitor will have authority to temporarily divert grading away from exposed fossils and halt construction activities in the immediate vicinity in order to professionally and efficiently recover the fossil specimens and collect associated data. The qualified paleontologist will prepare progress reports to be filed with the client and the lead agency.
C. At each fossil locality, field data forms will be used to record pertinent geologic data, stratigraphic sections will be measured, and appropriate sediment samples will be collected and submitted for analysis.
D. Matrix sampling would be conducted to test for the presence of microfossils. Testing for microfossils would consist of screen-washing small samples (approximately 200 pounds) to determine if significant fossils are present. If microfossils are present, additional matrix samples will be collected (up to a maximum of 6,000 pounds per locality to ensure recovery of a scientifically significant microfossil sample).
E. Recovered fossils will be prepared to the point of curation, identified by qualified experts, listed in a database to facilitate analysis, and reposited in a designated paleontological curation facility. The most likely repository is the SDNHM.
F. The qualified paleontologist will prepare a final monitoring and mitigation report to be filed with the client, the lead agency, and the repository.

SECTION 9.0 – REFERENCES

Barnes, L.G.
1976. Outline of eastern North Pacific fossil cetacean assemblages. Systematic Zoology, 25: 321–343.

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2006 Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California. U.S. Geological Survey Open-File Report 2006-1217. Scale 1:100,000.

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2010 Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.

APPENDIX A –CONFIDENTIAL SDNHM RECORDS SEARCH RESULT

3 June 2019

Ms. Lauren DeOliveira
Chambers Group, Inc.
600 West Broadway, Suite 250
Glendale, CA 91204

RE: Paleontological Records Search – 21169 Newport Beach Bike Bridge

Dear Ms. DeOliveira:

This letter presents the results of a paleontological records search conducted for the 21169 Newport Beach Bike Bridge project (Project), located in the western portion of the City of Newport Beach, Orange County, California. The Project site is bordered to the north and west by Superior Avenue, to the south by Pacific Coast Highway, and to the east by medical facilities.

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 potential following guidelines developed by the Society of Vertebrate Paleontology (SVP, 2010). 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 Units Underlying the Project Area

Published geological reports (e.g., Morton and Miller, 2006) covering the Project area indicate that the proposed Project has the potential to impact middle to late Pleistocene-age old paralic deposits and the middle to late Miocene-age Monterey Formation. These geologic units and their paleontological potential are summarized below. The SDNHM has three (approximately equivalent) recorded fossil localities within one mile of the Project site from Pleistocene-age marine terrace sands (discussed below under “old paralic deposits”).

old paralic deposits – Middle to late Pleistocene-age (approximately 781,000 to 11,000 years old) paralic deposits underlie the northeastern portion of the Project site. These deposits overlie the Monterey Formation over a marine abrasion platform, on top of which marine terrace sands were deposited. The SDNHM has three recorded fossil localities within a 1-mile radius of the Project site. Fossils were collected from approximately the same stratum exposed in gullies eroded into the bluffs on the north side of the Pacific Coast Highway, west of its intersection with Newport Boulevard. These localities yielded trace fossils (e.g., sponge borings in shell) and fossilized remains of nearshore marine invertebrates (e.g., encrusting colonial bryozoans, snails, oysters, scallops, clams, and tusk shells). Based on the diverse marine invertebrate and rare marine vertebrate remains recovered from these deposits nearby the Project site and elsewhere in coastal southern California, they are assigned a high paleontological potential (SVP, 2010).

Monterey Formation – The majority of the Project site is underlain by deep marine deposits of the middle to late Miocene-age (approximately 16 to 8 million years old) Monterey Formation. The SDNHM does not have any recorded fossil localities within a 1-mile radius of the Project site. More broadly, the Monterey Formation has produced extremely diverse assemblages of marine organisms ranging from microscopic diatoms and radiolarians to enormous sharks and baleen whales. The kinds of fossils found in the formation typically vary according to rock type, with diverse assemblages of diatoms, silicoflagellates, and radiolarians more characteristic of the siliceous shales and diatomites, and coccoliths, foraminiferans, sharks, rays, bony fish, sea birds, and marine mammals more characteristic of the phosphatic and calcareous mud shales. Well-preserved fossil remains of marine mammals, including pinnipeds, toothed whales, baleen whales, sea cows, and hippo-like desmostylians have also been recovered from diatomaceous strata of the Monterey Formation (Barnes, 1976). The Monterey Formation is, accordingly, assigned a high paleontological potential (SVP, 2010).

Summary and Recommendations

The high paleontological potential of old paralic deposits and the Monterey Formation (SVP, 2010), as well as the presence of recorded fossil collection localities nearby, suggests the potential for construction of the proposed 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 record search should be considered private and is the sole property of the San Diego Natural History Museum. Any use or reprocessing of information contained within this document beyond the scope of the 21169 Newport Beach Bike Bridge 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

Literature Cited

Barnes, L.G. 1976. Outline of eastern North Pacific fossil cetacean assemblages. Systematic Zoology, 25: 321–343.

Morton, D.M., and Miller, F.K. 2006. Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California. U.S. Geological Survey Open-File Report 2006-1217. Scale 1:100,000.

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Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology: 1–11.