PALEONTOLOGICAL RESOURCES ASSESSMENT

NEWPORT BEACH CITY HALL AND PARK DEVELOPMENT PLAN

CITY OF NEWPORT BEACH, ORANGE COUNTY, CALIFORNIA

LSA

June 2009

PALEONTOLOGICAL RESOURCES ASSESSMENT

NEWPORT BEACH CITY HALL AND PARK DEVELOPMENT PLAN

CITY OF NEWPORT BEACH, ORANGE COUNTY, CALIFORNIA

Prepared for:

City of Newport Beach
3300 Newport Beach Boulevard
Newport Beach, California 92658
(949) 644-3200

Prepared by:

Steven W. Conkling
LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614-4731
(949) 553-0666

LSA Project No. CNB0901

Data Base Information

Type of Study: Assessment
Localities Recorded: none
Localities Updated: none
USGS Quadrangle: Laguna Beach, California 7.5′
Acreage: 20 acres
Level of Investigation: CEQA
Key Words: CEQA, LACM, UCMP, Pleistocene sediments, Miocene, Monterey Formation

LSA

June 2009

TABLE OF CONTENTS

FIGURES

APPENDIX

1.0 MANAGEMENT SUMMARY

A Paleontological Resources Assessment was conducted by LSA Associates, Inc. (LSA) for the proposed Newport Beach City Hall and Park Development Plan for the City of Newport Beach (City), County of Orange (County), California. This assessment includes a review of area geology and previous paleontological discoveries, as well as a systematic pedestrian survey of the project area. Project plans indicate that there may be up 30 feet (ft) of excavation to reach the proposed subgrade levels.

The project area is located on sediments mapped as interbedded middle to late Pleistocene alluvium and nearshore marine deposits, as well as the middle Miocene Monterey Formation. Based on the current project description and the sediments that are likely to be encountered during ground-disturbing activities, there is a high potential for encountering paleontological resources from the original topographic surface throughout project grading. Therefore, it is recommended that a qualified paleontologist be contacted to prepare a Paleontological Resources Impact Mitigation Program (PRIMP). This program will include excavation monitoring and specimen recovery, including screen washing, preparation, identification, and curation of collected specimens into a museum repository. Based on the significance of any recovered specimens, the qualified paleontologist may set up conditions that will allow for monitoring to be scaled back to part-time as the project progresses. However, if significant fossils begin to be recovered after monitoring has been scaled back, conditions should also be specified that will allow increased monitoring as necessary. A final compliance report will provide details of monitoring and curation methods, fossil identification, and discussion, cataloging, and repository arrangements. Compliance with these recommendations will ensure that impacts to the paleontological resources are maintained below a threshold of significance.

Please note that this report serves only as documentation of the paleontological findings for the project area and in no way represents a geological assessment. Therefore, this report should not be used as such.

2.0 INTRODUCTION

LSA has performed a Paleontological Resources Assessment for the proposed City of Newport Beach City Hall and Park Development Plan located on an approximate 20-acre (ac), rectangular-shaped project site. The project site is located west of MacArthur Boulevard and east of Avocado Avenue and includes the existing Newport Beach Public Library (Library). A portion of the project is located north of San Miguel Drive. The project area is depicted on the United States Geological Survey (USGS) *Laguna Beach, California* 7.5-minute quadrangle map at an elevation varying between 120 and 240 ft above mean sea level (amsl) (Figure 1).

This assessment was conducted in compliance with the California Environmental Quality Act (CEQA). The purpose of this assessment was to identify any paleontological resources that may be affected by the proposed project and make mitigation recommendations that can be used during planning and design of the proposed project. Identification efforts for the purposes of this assessment consisted of reviews of geologic maps and searching the databases of the vertebrate department of the Natural History Museum of Los Angeles County (LACM) and the University of California Museum of Paleontology at Berkeley (UCMP) for previously recorded paleontological resources in the vicinity of the project. In addition, a pedestrian survey was conducted within the parcel.

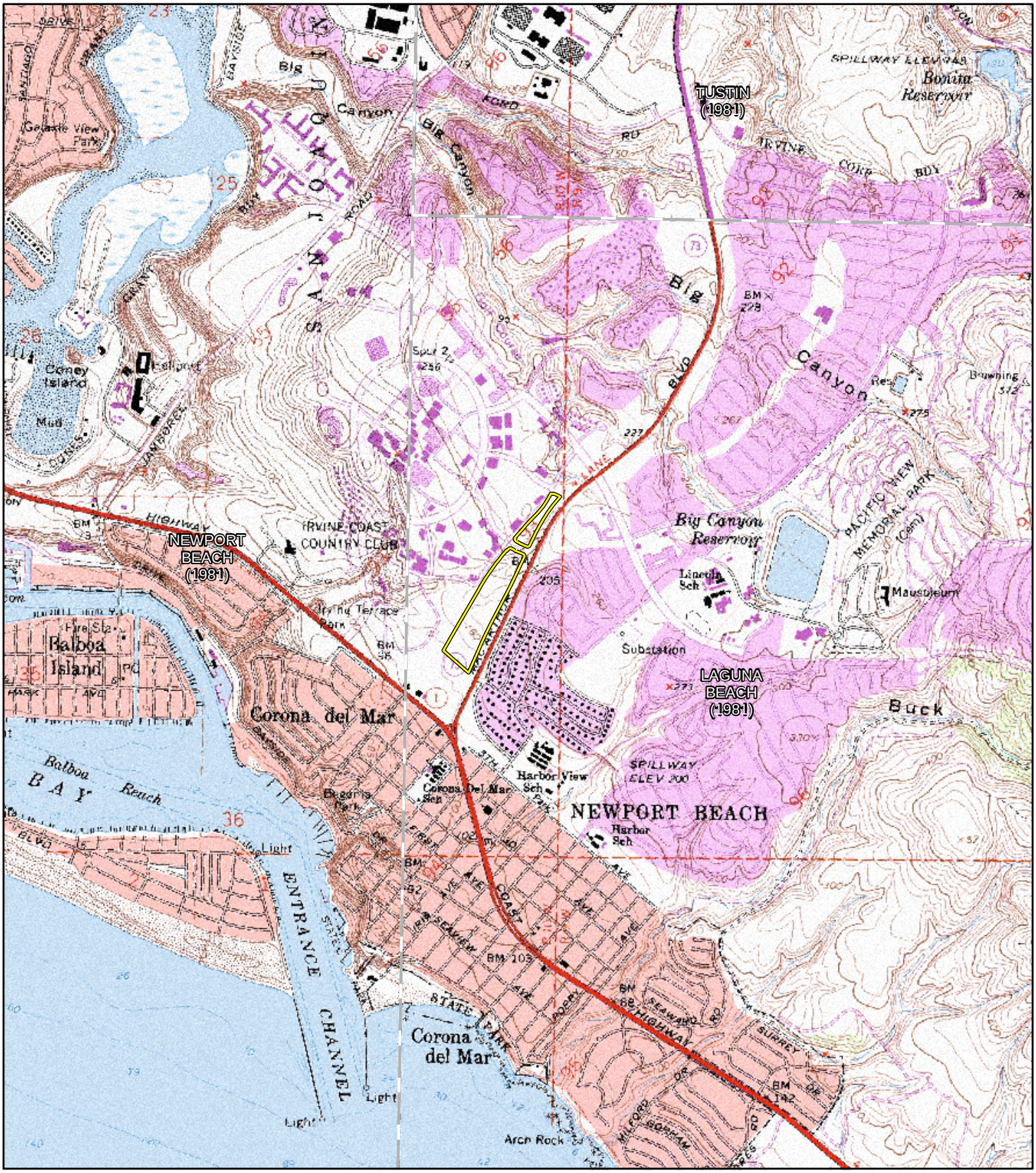
As Principal in Charge, Steve Conkling oversaw all aspects of the paleontological resource assessment as it was completed. Tasks associated with this assessment were conducted by LSA paleontologist Brooks Smith, who has a B.S. in Geology and prepared this report. Both Mr. Conkling and Mr. Smith are Orange County Certified Paleontologists.

2.1 PROJECT DESCRIPTION

The proposed project site is located in the City between Avocado Avenue and MacArthur Boulevard. The proposed project site is composed of three parcels (referred to as the northern, central, and southern parcels). Altogether, the proposed project site is approximately 20 ac. The northern parcel and the central parcel, both of which are currently vacant, are separated by San Miguel Drive. The southern parcel is occupied by the existing Newport Beach Public Library located at 1000 Avocado Avenue; the Library would remain after project implementation. The project area is depicted on the USGS *Laguna Beach, California* topographic quadrangle map in Irvine Ranch Section 93, Township 6 South, Range 10 West (Figure 1). It is at an elevation of 120–240 ft amsl.

The proposed project would result in the relocation of City functions (except for Fire Station No. 2)[1] currently taking place at the existing City Hall located at 3300 Newport Boulevard to the proposed project site. The proposed project includes eight primary components, including: (1) construction and operation of an approximately 98,000-square-foot (sf) City Hall administration building, Community Room, and Council Chambers; (2) a 450-space parking structure; (3) an approximately 17,000 sf

[1] Fire Station No. 2 serves a specific area of the Peninsula and Lido Isle and coincidentally is on the existing City Hall site.



LSA

FIGURE 1

LEGEND

Project Boundary

N

0 1000 2000

FEET

Newport Beach City Hall and Park Development Plan Project

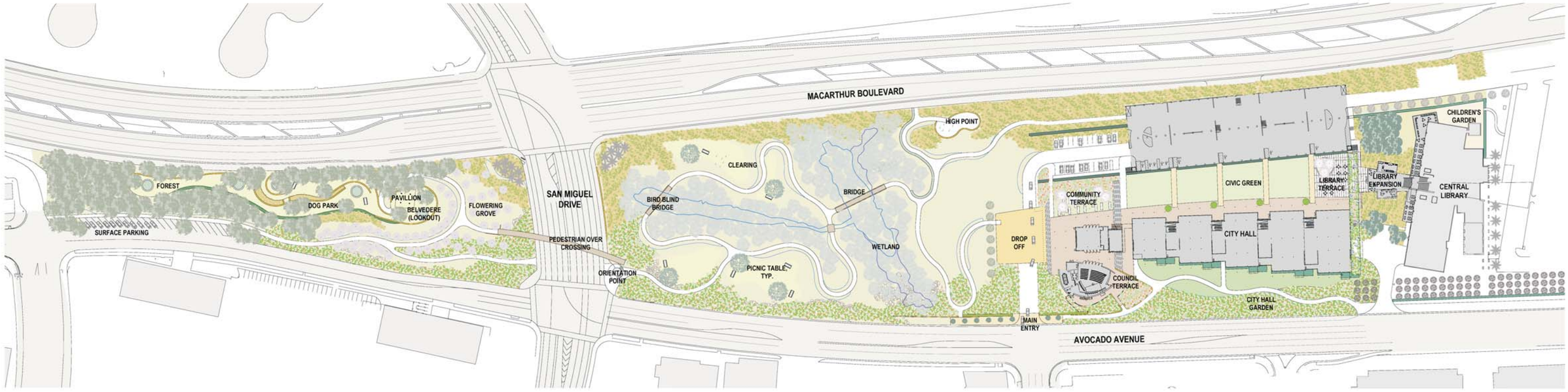
Project Location Map

SOURCE: USGS 7.5min. Quad. (Tustin (1981), Newport Beach (1981), Laguna Beach (1981)); City of Newport Beach (1/09)

I:\CNB0901\GIS\Fig1.mxd (4/30/2009)

expansion of the Newport Beach Central Library (Library); (4) a dedicated 4,800 sf Emergency Operations Center (EOC); (5) a Civic Green; (6) construction of a 14.3-acre public park that includes a dog park, wetlands area, bridges over the wetlands, lookout points, and a pedestrian overcrossing over San Miguel Drive; (7) widening of San Miguel Drive; and (8) reuse of the existing City Hall structures located at 3300 Newport Boulevard with public facilities uses. The conceptual project site plan is shown in Figure 2.

The proposed City Hall and parking structure would be located immediately north of the existing library. The proposed project would stretch from the northern boundary of the library structure to the northern end of the northern parcel, adjacent to the existing Orange County Transportation Authority facility. The park is proposed to include both natural and more formal park features. Within the wetlands area, invasive exotic planting would be removed, and efforts would be made to improve water quality. A pedestrian bridge over San Miguel Drive is also proposed to link the central and northern parcels. A dog park is proposed to be located in the section of the park north of San Miguel Drive.



LSA

FIGURE 2

N

0 100 200
FEET

SOURCE: Bohlin Cywinski Jackson/PWP/ARUP

I:\CNB0901\G\Site Plan-Cultural.cdr (6/22/09)

Newport Beach City Hall and Park Development Plan

Site Plan

3.0 PURPOSE OF THE INVESTIGATION

3.1 REGULATORY SETTING

This section describes the paleontological resources requirements of CEQA, the California Public Resources Code (PRC), and the City's General Plan goals and policies.

State

CEQA Requirements. CEQA requires that a determination be made as to whether a project would directly or indirectly destroy a unique paleontological resource or site or unique geological feature (State CEQA Guidelines Appendix G(v)(c)). If an impact is significant, CEQA requires feasible measures to minimize the impact (California Code of Regulations [CCR] Title 14(3) Section 15126.4 (a)(1)).

Public Resources Code Section 5097.5. PRC, Section 5097.5, prohibits the excavation or removal of any "vertebrate paleontological site, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Public lands are defined as lands owned by or under the jurisdiction of the State or any city, county, district, authority, or public corporation. Any unauthorized disturbance or removal of archaeological, historic, or paleontological materials or sites located on public lands is considered a misdemeanor.

Local

General Plan. The Historic Element in the City's General Plan addresses the protection and sustainability of Newport Beach's historic and paleontological resources. Goals and policies presented within the Historic Element are intended to recognize, maintain, and protect the community's unique historical, cultural, and archaeological sites and structures. Goal and policies related to paleontological resources presented in the Historic Element include:

- **Goal HR 2:** Identification and protection of important archaeological and paleontological resources within the City.
- **Policy HR 2, New Development Activities:** Require that, in accordance with CEQA, new development protect and preserve paleontological and archaeological resources from destruction, and avoid and mitigate impacts to such resources. Through planning policies and permit conditions, ensure the preservation of significant archaeological and paleontological resources and require that the impact caused by any development be mitigated in accordance with CEQA (Imp 11.1).

- **Policy HR 2.2, Grading and Excavation Activities:** Maintain sources of information regarding paleontological and archaeological sites and the names and addresses of responsible organizations and qualified individuals who can analyze, classify, record, and preserve paleontological or archaeological findings. Require a qualified paleontologist/archaeologist to monitor all grading and/or excavation where there is a potential to affect cultural, archaeological, or paleontological resources. If these resources are found, the applicant shall implement the recommendations of the paleontologist/archaeologist, subject to the approval of the City Planning Department (Imp 11.1).
- **HR 2.4, Paleontological or Archaeological Materials:** Require new development to donate scientifically valuable paleontological or archaeological materials to a responsible public or private institution with a suitable repository, located within Newport Beach, or Orange County, whenever possible (Imp. 11.1).

In addition, the City's Natural Resources Element also provides for the protection of paleontological resources with the following Goal and Policies:

- **Goal NR 18:** Protection and preservation of important paleontological and archaeological resources.
- **Policy NR 18.1 New Development:** Require new development to protect and preserve paleontological and archaeological resources from destruction, and avoid and minimize impacts to such resources in accordance with the requirements of CEQA. Through planning policies and permit conditions, ensure the preservation of significant archaeological and paleontological resources and require that the impact caused by any development be mitigated in accordance with CEQA (Imp 7.1).
- **Policy NR 18.2, Maintenance of Database Information:** Prepare and maintain sources of information regarding paleontological or archaeological sites and the names and addresses of responsible organizations and qualified individuals who can analyze, classify, record, and preserve paleontological and archaeological findings (Imp 10.1).
- **Policy NR 18.4, Donation of Materials:** Require new development, where on-site preservation and avoidance are not feasible, to donate scientifically valuable paleontological or archaeological materials to a responsible public or private institution with a suitable repository, located within Newport Beach or Orange County, whenever possible (Imp 11.1).

In the EIR certified by the City for its 2006 General Plan Update, fossil resources are also addressed. The EIR states,

> "As described previously, paleontological resources may be present in fossil-bearing soils and rock formations below the ground surface. A number of localities in the City have a variety of known significant paleontological resources, including portions of the Vaqueros formation that underlie the Newport Coast, the Newport Banning Ranch portion of the SOI ["Sphere of Influence"], the Topanga and Monterey Formations, and Fossil Canyon in the North Bluffs area of the [City]. Ground-disturbing activities in these fossil-bearing soils and rock formations have the potential to damage or destroy paleontological resources that may be present below the ground surface. Therefore, any activities resulting from implementation of the proposed General Plan Update, including construction-related and earth-disturbing actions, could damage or destroy fossils in these rock units. As with archaeological

resources, paleontological resources are generally considered to be historical resources, as defined in Section 15064.5(a)(3)(D) ("[h]as yielded, or may be likely to yield, information important in history or prehistory"). Consequently, damage or destruction to these resources could cause a significant impact.

"Policies within Goal HR 2 and NR 18 of the proposed General Plan Update are in place to protect paleontological resources. For example, Policy HR 2.1 and Policy NR 18.1 require any new development to protect and preserve archaeological resources from destruction, and that potential impacts to such resources be avoided and minimized through planning policies and permit conditions. These steps are in place to ensure that paleontological resources are preserved, and that any impact caused by development be mitigated in accordance with CEQA. As detailed in Impact 4.1-3, other policies under Goal HR 2 and Goal NR 18 ensure that information resources are maintained regarding these resources; grading and excavation activities where there is a potential to affect cultural or archaeological resources be monitored by a qualified archaeologist; cultural organizations, including Native American organizations, are notified of all developments that have the potential to adversely impact these resources; and that any new development donates scientifically valuable archaeological resources to a responsible public or private institution. The Newport Beach City Council has also established "Paleontological Guidelines (K-4)" requiring that the City prepare and maintain sources of information regarding paleontological sites.

"Compliance with policies within Goal NR 18 and the policies under Goal HR 2 would reduce this impact to a less-than-significant level by ensuring paleontological resources would be subject to scientific recovery and evaluation, which would ensure that important scientific information that could be provided by these resources regarding prehistory is not lost."

Cumulative Impacts

"Potential future development in the City of Newport Beach and the SOI could include excavation and grading that could potentially impact archaeological and paleontological resources and human remains. The cumulative effect of this future development is the continued loss of these resources. The potential loss of paleontological and archaeological resources with this future development would contribute to the degradation of the historic fabric of the City of Newport Beach. However, policies under the proposed General Plan Update and assigned mitigation measures would be implemented as appropriate to reduce the effect of this development by ensuring the evaluation and – where appropriate – scientific recovery and study of any resources encountered. CEQA requirements for the protection of archaeological and paleontological resources and human remains are applicable to development in the City of Newport Beach. If subsurface cultural resources are protected as they are discovered – as is required by law – impacts to these resources would be less than significant. As indicated above, given the mitigation measures that would be imposed and enforced throughout construction, the contribution of potential

> impacts from the proposed General Plan Update to the cumulative destruction of subsurface cultural resources throughout Newport Beach would not be cumulatively considerable, and would, therefore, be less than significant."

Newport Beach City Council Policy Manual. The Newport Beach City Council Policy Manual identifies policies applicable to cultural and paleontological resources. Policy K-4 applies to paleontological resources. Under this policy, the City is required to 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. If determined necessary by the Planning Director, it is the responsibility of a developer to examine the proposed site in order to determine the existence and extent of paleontological resources. Qualified individuals are to prepare and submit a written report describing the findings and making recommendations for further action. Based on the report and recommendations, the City is required to ensure that the findings or sites are recorded, preserved, and protected.

3.2 DISCUSSION

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 (SVP, 1995).

Paleontological remains are recognized as nonrenewable resources significant to our culture, and as such, are protected under provisions of the Antiquities Act of 1906 and subsequent related legislation, policies, and enacting responsibilities. The January 1, 1979, Clean Water Grant Program for the Protection and Preservation of Cultural Resources (California State Water Resources Control Board, Revision 6-11) defines cultural resources to include paleontological values and elucidates guidelines for preservation, summarizing some of the applicable legislation. Data recovery techniques are discussed therein (Section 7.4). A 1978 memorandum from Griswold E. Petty, the Acting Associate Director of the Bureau of Land Management (BLM), stated:

> "There is no universally accepted definition for a significant scientific paleontological resource. A definite determination can only be made by a qualified, trained paleontologist. Using the following guidelines, a paleontological resource is of significant scientific and educational value if it:
>
> 1. Provides important information of the evolutionary trends among organisms, relating living inhabitants of the earth to extinct organisms.
> 2. Provides important information regarding development of biological communities or interaction between botanical and zoological biotas.
> 3. Demonstrates unusual or spectacular circumstances in the history of life.

4. Is in short supply and in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and is not found in other geographic locations.

All vertebrate fossils have been categorized as being of significant scientific value." (Petty, 1978 memorandum, emphasis added).

Significant paleontological resources are fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically or stratigraphically important and those that add to an existing body of knowledge in specific areas stratigraphically, taxonomically, or regionally. They include fossil remains of large to very small aquatic and terrestrial vertebrates, remains of plants and animals previously not represented in certain portions of the stratigraphy, and assemblages of fossils that might aid stratigraphic correlations, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, paleoclimatology, and the relationships of aquatic and terrestrial species.

The SVP (1995) provides the following definitions of sensitivity.

- **Paleontological Sensitivity** is determined only after a field survey of the rock unit in conjunction with a review of available literature and paleontological locality records. In cases where no subsurface data are available, sensitivity may be determined by subsurface excavation.
- **Paleontological Potential** is the potential for the presence of significant nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have the potential for the presence of significant nonrenewable paleontological resources. The SVP has only three categories of sensitivity: High, Low, and Undetermined. The determination of a rock unit's degree of paleontological potential is first founded on a review of pertinent geological and paleontological literature and on locality records of specimens deposited in institutions. This preliminary review may suggest particular areas of known high potential. If a geographic area or geological unit is classified as having undetermined potential for paleontological resources, studies must be undertaken to determine whether that rock unit has a sensitivity of either High or Low. The field survey may extend outside the defined project to areas where rock units are better exposed. Each of the potentials is defined below in more detail.
    - **High Potential.** Rock units from which vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a potential for containing significant nonrenewable fossiliferous resources. These units include but are not limited to sedimentary formations and some volcanic formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical, and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than the Holocene, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant.

- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections. These deposits generally will not require protection or salvage operations.
- **Undetermined Potential.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

If an area is determined to have a high potential for containing paleontological resources, the SVP recommends that a program to mitigate impacts should be developed. In areas of high sensitivity, a preexcavation survey is also recommended to locate surface concentrations of fossils that might need special salvage methods.

The SVP developed a set of guidelines in 1995 in order to provide uniform procedures while mitigating impacts to paleontological resources within sediments that are likely to contain resources. These guidelines include supervision of all phases of mitigation by a professional paleontologist; monitoring for and salvage of paleontological resources during excavation; screen washing of sediments to recover small fossil specimens (if applicable); preparation of all collected specimens to a point of stabilization and identification; curation, including identification and cataloging of specimens; submission of all collected fossils for permanent storage into an institution, such as a museum with the ability to retrieve specimens for additional studies; and preparation of a final report after all operations are completed that details methods and results of monitoring, including geology, what specimens were recovered, and the significance of any finds.

4.0 METHODS

4.1 LOCALITY SEARCH

A paleontological locality search was conducted through geological and paleontological records maintained at LSA. In addition, LSA contacted the LACM and searched the online database of the UCMP[2] for additional locality information. This included a review of the area geology and any known paleontological resources recovered from the surrounding area and from the geologic formations or units that will likely be encountered during excavation activities.

The purpose of the locality search was to determine the geology of the area and establish the status and extent of previously recorded paleontological resources within and adjacent to the project area. With this knowledge, LSA could make an informed assessment of the potential effects of the proposed project on paleontological resources and evaluate the types of fossils that might be uncovered during ground-disturbing activities. In addition, the sensitivity of the sediments could be determined.

4.2 FIELD SURVEY

A pedestrian survey of the proposed project was conducted by LSA Paleontologist Steven W. Conkling and LSA Archaeologist Deborah K. B. McLean on March 31, 2009. The survey was conducted by walking parallel transects spaced approximately 15 ft apart. Intuitive deviations were made from transects to inspect likely-looking outcrops, cut slopes, cliffs, and rodent back dirt. Areas within the project covered with landscaping, thick vegetation, or artificial fill, were avoided and bypassed.

The purpose of this survey was to confirm the accuracy of the geologic mapping and to identify whether any paleontological resources might be exposed on the surface. In this way, LSA could document the existence of paleontological material prior to the beginning of ground-disturbing activities and locate areas within the project that might contain abundant remains.

[2] http://bscit.berkeley.edu/ucmp/loc.html.

5.0 RESULTS

5.1 LOCALITY SEARCH

Geology

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.

Specifically, the project is located at the northern end of the San Joaquin Hills. The San Joaquin Hills are a coastal extension of the Santa Ana Mountains and the westernmost range of the Peninsular Ranges Geomorphic Province (Barrie et al., 1992). The hills extend across approximately 90 square miles, extending from San Juan Capistrano in the south to the Huntington mesa in the north, including a 12 mi stretch of rugged coastline. Regional tectonic activity has uplifted the hills into a rough northwest-to-southeast-trending anticlinal structure. Grant et al. (1997) believe that much of uplift of the San Joaquin Hills has occurred due to movement along the San Joaquin Hills blind thrust fault. Grant et al. (1997) also state that the Hills have risen to their present maximum height of 1,164 ft over the last 1.2 million years, with an average uplift rate of 0.69–0.89 ft per 1,000 years. Exposed formations within the San Joaquin Hills have a combined thickness of 22,000 ft and range in age from the Paleocene to the Late Pleistocene (63 million–10,000 years) (Vedder, 1970). The Hills contain both marine and terrestrial sediments and intrusive igneous rocks. This mix of resistant igneous intrusives and soft to resistant sedimentary rock creates a terrain that is variously rugged or gently sloped, depending on the underlying strata. The seaward-facing hills adjacent to the coast have been shaped by a series of Pleistocene marine terraces and conventional erosion. The inland-facing portions of the hills have been shaped only by conventional erosion.

Within the project area, Morton and Miller (2006) have mapped the project area as being underlain by middle Pleistocene (413,000 years before the present [ybp]) Old Paralic Deposits and the Middle Miocene (13.5 to 7 million year old) Monterey Formation. Leighton Consulting, Inc. (2008) conducted a due diligence geotechnical exploration for the proposed project. This report also indicates the project area is covered with Quaternary Terrace deposits cut into the underlying Monterey Formation bedrock. Although not mapped within the project area, it is likely that artificial fill may also be present within the upper few feet of some areas of the project site. All these deposits are described in more detail below. The LACM indicated that Quaternary Terrace deposits and the Monterey Formation may be encountered during excavation of the project.

Monterey Formation. The Monterey Formation is a well-studied rock unit that is found along the west coast of North America. It was first named by Blake (1856) after exposures near Monterey, California, a little over 300 mi to the northwest of the study area. It is famous for its rich petroleum

reserves that were formed from abundant organic matter, primarily microscopic diatoms, contained within the sediments. In general, the Monterey Formation is composed primarily of deep marine deposits of diatomite, diatomaceous siltstone, mudstone, dolostone, and chert. The upper section of the marine Monterey Formation is Middle to Late Miocene (Luisian and Mohnian) and possibly older in the lower section (Morton et al., 1974). South of the Orange/San Diego County line, Ehlig (1979) reports that the basal Monterey consists of conglomerates and coarse-grained sandstones derived from the underlying San Onofre Breccia. Sandstone and siltstone can range from thinly to massively bedded. Some of the shale contains very thin, well-developed bedding that is locally rhythmic.

Locally, along the coastline, the Monterey Formation is approximately 1,200 ft thick, thinning to 300 ft as it moves inland (Smith, 1960). It unconformably overlies the Sespe, Vaqueros, San Onofre Breccia, and Topanga Formations. Locally, however, it has a gradational and interfingering contact with the San Onofre Breccia. It has a gradational contact with the overlying Capistrano Formation east of Oso Creek; elsewhere, it is unconformably overlain by the Niguel Formation, Marine Terrace Deposits, and nonmarine terrace deposits. It is widespread in the southern coastal ranges of California, but in Orange County is exposed only in the southern portion of the County. It correlates with the parts of the Puente Formation in the central to northern Santa Ana Mountains and Puente Hills of Orange County and the Modelo Formation of Los Angeles County. Vedder et al. (1957) have made an arbitrary boundary between the Monterey and correlative members of the Puente. East of the Cristianitos Fault, Oso Creek is the boundary; west of the Cristianitos Fault, a general east-west line from near Lambert Reservoir to the Cristianitos Fault is the boundary.

Paralic Deposits. Paralic deposits are those deposits located in the transition area between the sea and the land and can include a mixture of deposits from subtidal to beach deposits to colluvium and alluvium from the land. Paralic deposits, as described by Morton and Miller (2006), are mostly poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine, and colluvial deposits that locally may include older alluvium. These deposits can be composed of siltstone, sandstone, and conglomerate; however, within the project area, they are mapped as being primarily silty. These deposits rest on the now-emergent wave-cut abrasion platforms preserved by regional uplift. Paralic deposits can essentially be thought of as an interfingering of Pleistocene marine terrace deposits and older alluvium.

Pleistocene Marine Terrace Deposits. Pleistocene (80,000 to 1,230,000 ybp [Barrie et al., 1992]) Marine Terrace Deposits consist of light brown, orange brown, and yellow brown to gray mixtures of sands, gravels, and pebbles with some minor silt. The sand grains tend to be subangular to subrounded, while the gravels and pebbles are generally subrounded to rounded, with occasional angular clasts derived from the underlying formation. Bedding is usually poor; however, lenticular beds and cross-bedding do occur. The deposits tend to be friable to weakly indurated. Sand grains are predominantly quartz and feldspar, while the gravels are quite variable: plutonics, volcanics, metamorphics, and fragments of the underlying, or nearby, bedrock formations.

Older Alluvium. Older alluvium is an alluvial deposit that was deposited during the Pleistocene (1.8 million to 10,000 ybp). It can include deposits such as nonmarine terrace deposits, older alluvial wash, and older alluvial fan deposits. These sediments can also be found at depths below the active stream channels and younger alluvial sediments. These deposits consist of interbedded silt, clayey sand, and conglomeratic coarse-grained sands. Colors can vary from light yellows to browns to reds. The sand grains are generally subangular to subrounded, while the gravels and cobbles are rounded to well-rounded.

Artificial Fill. Artificial fill consists of sediments that have been removed from one location and transported to another by humans. Sometimes the transportation distance can be a few feet to dozens of miles. Depth of artificial fill can vary from a few inches to hundreds of feet; however, based on review of aerial photographs from 1952 and 1972, the artificial fill on site is probably limited to the upper few feet and consists of disturbed sediments moved around as roadways were initially developed, or otherwise graded or altered.

Paleontology

Monterey Formation. Several significant invertebrate and vertebrate localities are recorded from the south County area. These include fossils of crocodilians, fish, shark, ray, whale, dolphin, sea lion, sea cow, desmostylan, bivalves, gastropods, barnacles, bryozoan, and sand dollars. Morton et al. (1974) state that the upper part of this formation contains Late Miocene forms (Luisian and Mohinian), and the lower section contains sandstones with megafossils that suggest slightly older stages (*Pecten crassicardio* and *Vaquerosella* cf. *merriama*). Eisentraut and Cooper (2002) report that numerous fossil fish and marine mammal remains have been recovered from this formation on the Irvine coast and in the Laguna Hills area. They also state that a localized limestone deposit in the Aliso Viejo area known as "Pecten Reef" has produced abundant invertebrate and vertebrate fossils. As these sediments have produced significant vertebrate fossils, these sediments have a paleontological sensitivity rating of high.

During widening of MacArthur Boulevard, located immediately east of the project area, LSA recovered a diverse collection of plants, bony fish, and a sea lion from this unit (Conkling, 1997a). In 2006, during construction of Saint Mark Presbyterian Church, located 0.5 mi to the northeast, LSA collected bivalves, gastropods, leaves, petrified wood, and whale bone (Smith, 2006).

Older Alluvium. Fossils have been collected in similar deposits from excavations for roads, housing developments, retention basins, and quarries in the Los Angeles Basin and vicinity (Jefferson, 1991a and 1991b; Conkling, 1997b and 1988; Miller, 1971). Remains of Rancholabrean animals, including elephant, horse, bison, camel, saber tooth cat, deer, and sloth are known from these localities. The potential exists to encounter similar fossils in all Pleistocene (1.8 million to 10,000 years) alluvium, as these sediments have produced significant vertebrate fossils that have a paleontological sensitivity rating of high.

Marine Terrace Deposits. Abundant shallow water fossils have been discovered within Marine Terrace Deposits. Fossils include both invertebrate and vertebrate fossils such as bivalves, gastropods,

echinoderms, sharks, fish, seals, whales, horse, camel, bison, and mastodon. During monitoring for the widening of MacArthur Boulevard, LSA collected gastropods and bivalves from the Marine Terrace Deposits (Conkling, 1997a). Jefferson (1991) states that there are several vertebrate localities that produced terrestrial mammals, marine mammals, fish, birds, reptiles, and amphibians along MacArthur Boulevard and Palisades Road within marine terrace deposits. The closest are LACM 4254, located immediately south of the southern boundary, where a fossil duck (*Chendytes* sp.) was found and LACM 4211, located on the corner of Avocado Avenue and Pacific Coast Highway, where fossil croakers (*Genyonemus lineatus* and *Seriphus politus*) have been found. Marine Terrance Deposits are, therefore, considered to have a paleontological sensitivity rating of Very High.

Artificial Fill. Although artificial fill can contain fossils, these fossils have been removed from their original location and are thus out of context. They are not considered to be important for scientific study. Artificial fill, therefore, has a low sensitivity for containing fossils.

Museum Records

The LACM states that the sediments from Quaternary marine terrace deposits and the middle Miocene Monterey Formation outcrop within the project area. The LACM does not have any recorded vertebrate localities within the project area. However, the LACM does have several vertebrate localities near the project area from the same or similar sedimentary deposits.

Monterey Formation. The closest LACM vertebrate fossil localities from the Monterey Formation are LACM 1160 and LACM 7139, located north-northwest of the project area along Backbay Drive. These localities have produced a fauna of bony fish and baleen whales. The LACM also reports a large quantity of localities from the Monterey Formation throughout Orange County.

Marine Terrace Deposits. The closest LACM vertebrate fossil localities from the marine terrace deposits is LACM 4254, located just outside the southeastern boundary of the project. This locality produced a fossil diving duck (*Chendytes* sp.). Further to the north, along MacArthur Boulevard in the Upper Newport Bay region, LACM 1066 produced an extensive collection of primarily terrestrial vertebrates.

The LACM believes that shallow excavations and surface grading are unlikely to uncover significant vertebrate fossils. However, it states that deeper excavations extending down to Late Pleistocene or older sediments may encounter significant vertebrate remains and should therefore be closely monitored to quickly and professionally collect any vertebrate remains without impeding development. The LACM further believes that any fossils collected during mitigation activities should be placed into an accreted scientific institution for the benefit of current and future generations. The LACM results and recommendations letter is attached in Appendix A

A search of the online database from the UCMP indicates that the UCMP knows of no vertebrate fossils within the project area. However, UCMP does indicate that there are 4 vertebrate localities, 6 invertebrate localities, and 100 microfossil localities within the Monterey Formation within Orange County. Of the 100 microfossil localities, all but 12 are from the vicinity of Newport Bay.

5.2 FIELD SURVEY

The pedestrian survey confirmed the geology as mapped by Morton and Miller (2006), and Leighton (2008). The surface of the project is composed of weathered Pleistocene Terrace deposits cut into the Monterey Formation bedrock. The observed native sediments were composed of light grey silty sand with cobbles and small boulders. Limited invertebrate fossils from the Pleistocene sediments were observed during the survey.

5.3 SUMMARY

Based on the results of the locality search and the project description, sensitive sediments that may contain fossil remains do exist within the project area, and there is the potential to encounter paleontological resources during all ground-disturbing activities associated with this project. Middle Pleistocene (413,000-year-old) marine and terrestrial sediments are exposed on the surface of the project; these sediments are underlain by the middle Miocene Monterey formation. Both of these sediments are considered to have a High to Very High paleontological sensitivity.

6.0 RECOMMENDATIONS

In order to mitigate potential adverse impacts to nonrenewable paleontological resources in High and Very High sensitivity sediments, LSA recommends that a paleontologist be retained and that a standard PRIMP be implemented and followed for the project. The PRIMP should be consistent with the guidelines of the SVP (1995) and should include but not be limited to the following:

- Attendance at the pregrade conference in order to explain the mitigation measures associated with the project.
- During construction excavation, a qualified vertebrate paleontological monitor shall initially be present on a full-time basis whenever excavation will occur within the sediments that have a High paleontological sensitivity rating and on a spot-check basis in sediments that have a Low sensitivity rating. Based on the significance of any recovered specimens, the qualified paleontologist may set up conditions that will allow for monitoring to be scaled back to part-time as the project progresses. However, if significant fossils begin to be recovered after monitoring has been scaled back, conditions should also be specified that will allow increased monitoring as necessary. The monitor should be equipped to salvage fossils and/or matrix samples as they are unearthed in order to avoid construction delays. The monitor must be empowered to temporarily halt or divert equipment in the area of the find in order to allow removal of abundant or large specimens.
- The underlying sediments may contain abundant fossil remains that can only be recovered by a screening and picking matrix; therefore, it is recommended that these sediments occasionally be spot-screened through one-eighth to one-twentieth-inch mesh screens to determine whether microfossils exist. If microfossils are encountered, additional sediment samples (up to 6,000 pounds) shall be collected and processed through one-twentieth-inch mesh screens to recover additional fossils. Processing of large bulk samples is best accomplished at a designated location within the project that will be accessible throughout the project duration but will also be away from any proposed cut or fill areas. Processing is usually completed concurrently with construction, with the intent to have all processing completed before, or just after, project completion. A small corner of a staging or equipment parking area is an ideal location. If water is not available, the location should be accessible for a water truck to occasionally fill containers with water.
- Preparation of recovered specimens to a point of identification and permanent preservation. This includes the washing and picking of mass samples to recover small invertebrate and vertebrate fossils and the removal of surplus sediment from around larger specimens to reduce the volume of storage for the repository and the storage cost for the developer.
- Identification and curation of specimens into a museum repository with permanent, retrievable storage, such as the LACM.
- Preparation of a report of findings with an appended, itemized inventory of specimens. When submitted to the Lead Agency, the report and inventory would signify completion of the program to mitigate impacts to paleontological resources.

By following the above guidelines, impacts to nonrenewable paleontological resources will be reduced to levels that are less than significant.

7.0 REFERENCES

Barrie, D., T. Totnall, and E. Gath
1992 Neotectonic Uplift and Ages of Pleistocene Marine Terraces, San Joaquin Hills, Orange County, California. In Heath, E.G., W.L. Lewis, eds., 1992, *The Regressive Pleistocene Shoreline, Coastal Southern California,* South Coast Geological Society, Annual Field Trip Guidebook Number 20.

Barrows, A. G.
1974 *A Review of the Geology and Earthquake History of the Newport-Inglewood Structural Zone, Southern California*. California Division of Mines and Geology Special Report 114, p. 115.

Blake, W.P.
1856 *Notice of Remarkable Strata Containing the Remains of Infusoria and Polythalmia in the Tertiary Formation of Monterey, California.* Academy Natural Sciences Philadelphia Proclamations, v. 7, pp. 328–331.

Conkling, S.W.
1997a *Paleontological Resource Monitoring Report, Macarthur Boulevard Widening Project from Pacific Coast Highway to 0.4 Miles North of San Joaquin Hills Road, City of Newport Beach, Orange County, California.* Prepared by LSA Associates, Inc for the City of Newport Beach. LSA Project Number DEI630.

1997b *Report of Paleontological Resource Monitoring, Trabuco Retention Basin, Orange County, California.* Prepared by LSA Associates, Inc. for the County of Orange Environmental Management Agency. On file at LSA.

1988 *A Floral and Fauna Analysis of Clark Regional Park (La Habra Formation: Rancholabrean), Orange County, California*, Abstract, Journal of Vertebrate Paleontology, 8(3), p. 12A.

Ehlig, P. L.
1979 Miocene Stratigraphy and Depositional Environments of the San Onofre Area and Their Tectonic Significance. *In:* Stewart, C. J., ed., A Guidebook to Miocene Lithofacies and Depositional Environments, Coastal Southern California and Northwestern Baja California, Pacific Section, Society of Economic Paleontologists and Mineralogists, published for the 1979 annual meeting of the Geological Society of America: 43–51.

Eisentraut, P., and J. Cooper.
2002 Development of a Model Curation Program for Orange County's Archaeological and Paleontological Collections. Prepared by California State University, Fullerton and submitted to the County of Orange PFRD/HPB.

Grant, L. B., Mueller, K. J., Gath, E. M., Cheng, H., Edwards, R. L., Munro, R., Kennedy, G. L.
1999 *Late Quaternary Uplift and Earthquake Potential of the San Joaquin Hills, Southern Los Angeles Basin, California*. Geological Society of America Geology, Volume 27, No. 11, pp. 1031–1034.

Jefferson, G.T.
1991a *A Catalogue of Late Quaternary Vertebrates from California: Part One. Non-marine Lower Vertebrate and Avian Taxa*. Natural History Museum of Los Angeles County Technical Reports Number 5, Los Angeles.

1991b *A Catalogue of Late Quaternary Vertebrates from California: Part Two. Mammals*. Natural History Museum of Los Angeles County Technical Reports Number 7, Los Angeles.

Leighton Consulting, Inc.
2008 *Due Diligence Geotechnical Exploration for the Proposed City Hall and Parking Structure, Newport Beach, CA*, report prepared for the City of Newport Beach, California.

Miller, W.E.
1971 *Pleistocene Vertebrates of the Los Angeles Basin and Vicinity (Exclusive of Rancho La Brea)*, Los Angeles County Museum of Natural History Bulletin, Science: No. 10.

Morton, P. K., W. J. Edgington, and D. L. Fife
1974 *Geology and Engineering Geologic Aspects of the San Juan Capistrano Quadrangle, Orange County, California*, California Division of Mines and Geology Special Report 112.

Norris, R.M., and R.W. Webb
1976 *Geology of California*, John Wiley and Sons, Inc., Santa Barbara.

Pointi, Daniel J., and Kenneth R. Lajoie
1992 Chronostratographic Implications for the Techtonic Deformation of Palos Verdes and Signal Hills, Los Angeles Basin, California. *In:* Heath, E.G., W.L. Lewis, eds., 1992, *The Regressive Pleistocene Shoreline, Coastal Southern California,* South Coast Geological Society, Annual Field Trip Guidebook Number 20.

Saucedo, George J., H. Gary Greene, Michael P. Kennedy, and Stephen P. Bezore
2003 *Geologic Map Of The Long Beach 30' x 60' Quadrangle, California*., Scale 1:100,000. Digital Database by Janet Tilden, Jason D. Little, Marina T. Mascorro, and Eric W. Ford. Version 1.0. California Geological Survey, Regional Geologic Map Series, Map 5.

Sharp, R.P.
1976 *Geology: Field Guide to Southern California,* Kendall/Hunt Publishing Company, Second Edition, p. 181.

Smith, Brooks R.
2006 *Paleontological Resources Mitigation Monitoring Report – Saint Mark Presbyterian Church Project, City of Newport Beach, Orange County, California*. Prepared by LSA Associates, Inc. for Barnard Ventures, LLC. LSA project number BAV530.

Smith, P.B.
1960 Foraminifera of the Monterey Shale and Puente Formation, Santa Ana Mountains and San Juan Capistrano Area, California, United States Geologic Survey, Professional Paper 294-M:463–495.

Society of Vertebrate Paleontology
1995 *Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines*. Society of Vertebrate Paleontology News Bulletin, No. 163, January 1995, pp. 22–27.

United States Geological Survey
1966 *Laguna Beach, California* 7.5-Minute Topographic Quadrangle Map, Scale 1:24,000. Topography from photogrammetric methods from aerial photographs taken in 1964 and field checked in 1966. Revisions shown in purple and woodland compiled from aerial photographs taken in 1978 and other sources. This information not field checked. Map edited (photorevised) in 1981. United States Geological Survey, Denver, Colorado 80255.

Vedder, J. G.
1970 *Summary of the San Joaquin Hills*, *In:* Headlee, L. A. et al., editors, Geologic Guidebook, *Southeastern Rim of the Los Angeles Basin, Orange County, California*, Society of Economic Paleontologists and Mineralogists and the Society of Exploration Geophysicists, p. 2.

Vedder, J. G., R. F. Yerkes, and J. E. Schoellhamer
1957 Geologic Map of the San Joaquin Hills Area, San Juan Capistrano Area, Orange County, California, United States Geologic Survey Oil and Gas Investigation Map OM-193, Map Scale 1:24,000.

APPENDIX A

NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY – LOCALITY SEARCH RESULTS LETTER

Natural History
of Los Angeles County

900 Exposition Boulevard • Los Angeles, CA 90007

Vertebrate Paleontology Section
Telephone: (213) 763-3325
FAX: (213) 746-7431
e-mail: smcleod@nhm.org

24 February 2009

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614-4731

Attn: Brooks Smith, Cultural & Paleontological Resources Group

re: Paleontological Resources Records Search for the proposed City of Newport Beach City Hall, LSA Project # CNB0901, in the City of Newport Beach, Orange County, project area

Dear Brooks:

I have thoroughly searched our paleontology collection records for the locality and specimen data for the proposed City of Newport Beach City Hall, LSA Project # CNB0901, in the City of Newport Beach, Orange County, project area as outlined on the portion of the Laguna Beach USGS topographic quadrangle map that you sent to me via e-mail on 29 January 2009. We do not have any vertebrate fossil localities that lie directly within the proposed project boundaries, but we do have localities nearby from the same sedimentary deposits that occur in the proposed project area.

Surface deposits in most of the proposed project area consist of exposures of marine Quaternary terrace deposits, with a mixture of terrestrial components. In the northern portion of the proposed project area there are exposures of the marine Late Miocene Monterey Formation that also underlies the Quaternary deposits in the rest of the proposed project area. Our closest locality from the Quaternary deposits is LACM 4254, just outside the southeastern boundary of the proposed project area along MacArthur Boulevard, that produced a specimen of the 'diving duck' *Chendytes*. We have numerous other localities in the Quaternary Terrace deposits in the general area, especially LACM 1066 along the Upper Newport Bay directly north of the proposed project area that produced an extensive fauna of primarily terrestrial vertebrates (see W. E. Miller, 1970. Pleistocene vertebrates of the Los Angeles basin and vicinity (exclusive of Rancho La Brea). Los Angeles County Museum Science Bulletin, 10:1-124). Our two closest localities from the Monterey Formation area LACM 1160 and LACM 7139, north-northwest of the proposed project area in the cliffs along Backbay Drive on both sides of San Joaquin Hills Road, that have produced fossil bony fish, Osteichthyes, and baleen whales, Mysticeti. We have a great number of vertebrate fossil localities from the Monterey Formation in Orange County, primarily farther east in the hills south of the San Diego Freeway (I-405) and on both sides of the Golden State Freeway (I-5).

Any excavations in the proposed project area may well encounter significant vertebrate fossils from the Quaternary deposits or the marine Late Miocene Monterey Formation. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally collect any vertebrate fossil remains without impeding development. Any fossils collected from mitigation should be placed in an accredited 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: draft invoice