3.6 Geology and Soils

This section identifies and describes the geology and soils conditions and hazards and analyzes the effects of the Proposed Project's impacts related to these resources as well as paleontological resources. The section contains: (1) a description of the existing regional and local conditions of the Project Site and the surrounding areas; (2) a summary of the regulations related to geology and soils; and (3) an analysis of the potential impacts related to geology and soils associated with the implementation of the Proposed Project.

Comments received in response to the NOP for the EIR regarding geology and soils can be found in Appendix B. Any applicable issues and concerns regarding potential impacts related to geology and soils as a result of implementation of the Project are analyzed within this section.

The analysis included in this section was developed based on project-specific construction and operational features, the *Paleontological Resources Assessment Report* prepared by ESA and dated January 2019 (Appendix X), and the site-specific existing conditions including geotechnical hazards identified in the preliminary geotechnical investigation from AECOM dated September 14, 2018.[1]

3.6.1 Environmental Setting

Regional Setting and Project Vicinity

The Project Site is located in the northern Peninsular Ranges geomorphic province close to the boundary with the Transverse Ranges geomorphic province. The Transverse Ranges geomorphic province is characterized by east-west trending mountain ranges that include the Santa Monica Mountains. The southern boundary of the Transverse Ranges province is marked by the Malibu Coast, Santa Monica, Hollywood, Raymond, Sierra Madre, and Cucamonga faults. The Peninsular Range province is characterized by northwest/southeast trending alignments of mountains and hills and intervening basins, reflecting the influence of northwest trending major faults and folds controlling the general geologic structural fabric of the region. This province extends northwesterly from Baja California into the Los Angeles Basin and westerly into the offshore area, including Santa Catalina, Santa Barbara, San Clemente and San Nicolas islands. It is bounded by the Colorado Desert along the San Jacinto fault zone on the east. The Los Angeles Basin is the northernmost part of the Peninsular Ranges province. The Project Site is located within the Los Angeles Basin which is a broad sediment-filled trough that forms an alluvial plain of low relief. The basin was created by tectonic subsidence and subsequent deposition of sediments derived from ancestral streams from erosion along the flanks of the local mountains since the Pliocene time (approximately 2.6 million to 11,700 years ago). Within this portion of

1 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.

the basin, thick accumulations of non-marine to shallow marine deposits overlie older marine sediments.[2]

Project Site

Locally, the Project Site is located within the southwest block of the Los Angeles Basin and is part of the Torrance Plain which is a southward-dipping gently-sloping alluvial plain developed by continued uplift and subsequent filling of sediments derived from headward erosion along the flanks of the Santa Monica Mountains and local uplands.[3] The southwestern block of the Los Angeles Basin is interrupted by a series of left-stepping echelon pattern of dome-shaped hills. These hills (the Baldwin, Dominguez, and Signal Hills) which were formed due to folding and deformation produced by the Newport-Inglewood Fault Zone, extend southeasterly from the Santa Monica Mountains on the north to the San Joaquin Hills in the Newport Beach area to the south.

Overall, the Project Site is in a relatively level area that is blanketed by artificial fill overlying native alluvial and older alluvial deposits. Due to the varied history of different developments throughout the Project Site, some of the fill could have been placed with or without control following demolition of older structures that occupied most of the parcels. There are no known records of fill placement available, but the borings drilled at the Project Site during the preliminary geotechnical investigation encountered artificial fill to depths ranging from 5 to 10 feet below ground surface (bgs).[4] According to the preliminary geotechnical report, native materials underlying the fill consist of alluvial sediments described as fine to medium-grained silty sand and sand with trace fine gravels interbedded with discontinuous flood plain fine-grained sediments consisting of clayey silt, lean clay, and sandy clay.[5] Based on the geotechnical report borings, the younger alluvium may extend to depths ranging from 30 to 40 feet bgs.[6] with older alluvium which consists of dense to very dense silty sands and stiff to hard sandy clays was noted as present from approximately 30 to 40 bgs to the maximum depth explored of 100 feet bgs.; however However, geological mapping indicates that older alluvium is present at the surface (below fill soils).

Groundwater was encountered during the preliminary investigation at depths that were generally below 75 feet bgs. According to Seismic Hazard Zone Report 027, as referenced in the preliminary geotechnical report, the historically highest groundwater level in the area has been inferred to be greater than 50 feet bgs.[7]

2 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.
3 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.
4 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.
5 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.
6 Note that the description of the younger alluvium does not agree with the geologic mapping for the area (Diblee, 2007) which shows the site as being underlain by Older alluvium. See also discussion in the Paleontology methodology.
7 AECOM, Preliminary Geotechnical Investigation, September 14, 2018.

Fault Rupture

Background

Fault rupture is defined as the displacement that occurs along the surface of a fault during an earthquake. Based on criteria established by the California Geological Survey (CGS), faults are classified as either active, potentially active, or inactive.[8] Faults are considered active when they have shown evidence of movement within the past 11,000 years (i.e., Holocene epoch). Potentially active faults are those that have shown evidence of movement between 11,000 and 1.6 million years ago (Quaternary age). Faults showing no evidence of surface displacement within the last 1.6 million years are considered inactive.

Buried thrust faults are defined as faults that do not exhibit surface expression but that nonetheless can become a potential significant source of seismic activity. Since they are buried, their existence is usually not known until they produce an earthquake. Several blind thrust faults underlie the Los Angeles Basin at depth including the Puente Hills Blind Thrust, Compton Thrust, and Upper Elysian Park (**Figure 3.6-1**). However, blind thrust faults are not exposed at the ground surface and do not present a potential for surface fault rupture.

Commented [1]: Blind, or buried? Both terms used seemingly interchangeably in this paragraph.

The Alquist-Priolo Earthquake Fault Zoning Act (formerly known as the Alquist-Priolo Special Studies Zones Act) established state policy to identify active faults and determine a boundary zone on either side of a known fault trace, called the Alquist-Priolo Earthquake Fault Zone. The delineated width of an Alquist-Priolo Earthquake Fault Zone is based on the location precision, complexity, or regional significance of the fault and can be between 200 and 500 feet in width on either side of the fault trace. If a site lies within a designated Alquist-Priolo Earthquake Fault Zone, a geologic fault rupture investigation must be performed to demonstrate that a proposed building site is not threatened by surface displacement from the fault, before development permits may be issued.

Project Site

Based on the available geologic data, no active or potentially active faults with the potential to cause surface fault rupture are known to be located directly beneath the Project Site (includes the Arena Site, the West Parking Garage Site, the East Parking and Hotel Site, and the Well Relocation Site). The closest active fault to the Project Site with surface rupture potential (e.g., non-blind thrust faults) is the Newport-Inglewood Fault Zone located 1.13 miles to the east. The Project Site is not located within or near a designated Alquist-Priolo Earthquake Fault Zone.

Ground Shaking

The Project Site is located within a very seismically active Southern California region, within 50 miles of many active or potentially active faults that are capable of producing very strong ground shaking. The Newport-Inglewood fault is the closest and most significant active fault to the Project Site. As mentioned above, the Newport-Inglewood fault zone is about 1.13 miles to the

8 The California Geological Survey was formerly called the California Division of Mines and Geology (CDMG).

east. The Newport-Inglewood fault is considered to connect with fault zones south of Newport Beach (The "offshore zone of deformation", and the Rose Canyon fault) forming a system of faults that extends from Santa Monica to Baja California. The Newport-Inglewood fault was the source for the 1933 magnitude 6.4 (M6.4) Long Beach earthquake. It caused major damage and

Figure 3.6-1 Regional Fault Locations

the loss of 115 lives in Long Beach and surrounding communities of Los Angeles. Other significant historic earthquakes that have occurred near the Project Site include:

- The 1971 San Fernando Earthquake (M6.6) on the San Fernando fault,
- The 1987 Whittier Earthquake (M6.0), and
- The 1994 Northridge Earthquake (M6.7).

The effects of seismic shaking are dependent on the distance between the Project Site and causative fault and the on-site geology. Based on the latest forecasting by the US Geological Survey, the Southern California region is expected to have a 93% likelihood of experiencing a magnitude 6.7 or greater earthquake over the following 30 years.[9] The secondary effects of seismic shaking potentially include soil liquefaction, lateral spreading, and landslides.

Subsidence

Subsidence is characterized as a sinking of ground surface relative to surrounding areas, and can occur when underlying soils fail to support new loadings such as structures or placement of additional fill materials. Subsidence in areas of thick alluvial deposits can also be associated with regional fluid (groundwater and/or petroleum) withdrawal, peat oxidation, or hydrocompaction. Subsidence can result in the development of ground cracks and damage to subsurface vaults, pipelines and other improvements.

Settlement can occur from immediate settlement, consolidation, shrinkage of expansive soil, and liquefaction (discussed below). Immediate settlement occurs when a load from a structure or placement of new fill material is applied, causing distortion in the underlying materials. This settlement occurs quickly and is typically complete after placement of the final load. Consolidation settlement occurs in saturated clay from the volume change caused by squeezing out water from the pore spaces. Consolidation occurs over a period of time and is followed by secondary compression, which is a continued change in void ratio under the continued application of the load. Soils tend to settle at different rates and by varying amounts depending on the load weight or changes in properties over an area, which is referred to as differential settlement. According to the geotechnical report, the presence of undocumented fill materials makes the Project Site susceptible to settlement unless site preparations such as removal of artificial fill and replacement with engineered fill is conducted.

According to the California Division of Gas and Geothermal Resources (DOGGR), the Project Site is not located within the limits of any existing or former oil fields.[10] The Project Site does not contain existing groundwater extraction or oil wells, and no plugged or abandoned oil exploration wells are known to be located at the Project Site. The closest known oil production well is located approximately 1,200 feet northeast of the Arena Site and is categorized as "idle." Therefore,

9 United States Geological Survey (USGS), 2015. UCERF3: A New Earthquake Forecast for California's Complex Fault System, USGS Fact Sheet 2015-3009, March 2015.

10 California Division of Gas and Geothermal Resources (DOGGR), Well Finder, https://maps.conservation.ca.gov/doggr/wellfinder/#openModal/-118.32073/33.94064/15, accessed January 28, 2019.

while there is some history of oil extraction in the area, as indicated by a cluster of wells located over a half mile to the northeast, no groundwater or oil extraction occurs or is known to have historically occurred at the Project Site. According to the Geotechnical Report, the Project Site is not located within an area of known subsidence associated with fluid (e.g., groundwater or petroleum) withdrawal, and no major extraction of water or petroleum is planned in the future in the vicinity of the Project Site.[11]

Liquefaction

Liquefaction is a form of earthquake-induced ground failure that occurs when relatively shallow, loose, granular, water-saturated soils behave similarly to a liquid when subject to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow (50 feet bgs or less) groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. Liquefaction is typified by a buildup of pore-water pressure in the affected soil layer to a point where a total loss of inherent shear strength occurs, thus causing the soil to behave as a liquid. Saturated, loose to medium dense, near surface non-cohesive soils and cohesive soils exhibit the highest liquefaction potential. Liquefaction usually results in horizontal and vertical movement of soils from lateral spreading of liquefied materials and post-earthquake settlement of liquefied materials. The effects of liquefaction on level ground include potential seismic settlement, sand boils, ground oscillation, and bearing capacity failures below structures.

According to the preliminary geotechnical report, the Project Site is not located within an area identified as having a potential for liquefaction. The CGS documents historic-high groundwater levels in the area as being greater than 50 feet below ground surface, and groundwater was not encountered in the borings carried out during the site-specific investigation. Therefore, according to the geotechnical report prepared for the Project Site, the potential for liquefaction and associated ground deformation at the Project Site is considered low.

Seismically-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (particularly loose, uncompacted, and variable sandy sediments above the water table) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different amounts). Areas underlain by artificial fill can be susceptible to this type of settlement. Given the geologic setting of the Project Site and the surrounding area and the artificial fill identified beneath the Project Site, all areas of the Project Site could potentially be subjected to earthquake-induced settlement.

[11] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 12.

Site Soils

Compressible/Collapsible Soils

Compressible soils and collapse is considered to have a greater potential in soils with high porosities, low densities such as windblown silt deposits known as Loess which are often found in more arid climates. Loess is characterized by relatively low density and cohesion, appreciable strength and stiffness in the dry state, but is susceptible to significant deformations as a result of wetting. Typical collapsible soils are lightly colored, low in plasticity and relatively low densities. Based on the geotechnical borings completed at the Project Site, the underlying natural soils beneath the Project Site are generally firm and dense and thus would not be considered susceptible to collapse. The fill materials above the natural soils were characterized as not uniformly well compacted but nonetheless, the potential for collapse is considered to be very low.[12]

Expansive Soils

Expansive soils include clay minerals characterized by their ability to undergo significant volume change (shrink or swell) due to variation in moisture content. Sandy soils are generally not expansive, while clayey soils generally are expansive. Changes in soil moisture content can result from rainfall, irrigation, pipeline leakage, perched groundwater, drought, or other factors. Volumetric change of expansive soil may cause excessive cracking and heaving of structures with shallow foundations, concrete slabs-on-grade, or pavements supported on these materials.

According to the Geotechnical Report, the materials encountered in the exploratory borings conducted at the Project Site include: (1) a mantling of artificial fill to a depth of 12½ feet bgs consisting primarily of silty sand and sand with silt and gravel; (2) alluvial deposits from 12½ feet to 30 feet bgs consisting of sand, gravel and cobles; and (3) alluvial deposits from 30 feet bgs to the maximum boring depths up to 130 feet bgs consisting of silty sand, sand, silty clay and sandy clay.[13] Typically, sandy soils have a low expansion potential while clayey soils can have a high expansion potential. The predominance of granular content in the soils onsite including gravels, sands, and cobbles would indicate a generally low potential for expansive soils at the Project Site.

Corrosive Soils

Soil corrosion is a geologic hazard that affects buried metals and concrete materials that are in direct contact with soil or bedrock. Depending on the chemical constituents of the soil or bedrock, electrochemical corrosion processes can degrade the structural integrity of the buried metal or concrete. Soil corrosion is a complex phenomenon, with a multitude of variables involved. Pitting corrosion and stress-corrosion cracking (SCC) are a result of soil corrosion, which can eventually lead to substantive damage.

[12] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.
[13] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. pp. 9 and 10.

The results of corrosivity tests conducted as part of the geotechnical investigation for the Project Site indicated that the on-site soils, at present moisture content, are mildly corrosive to ferrous metals, aggressive to copper, and that the potential for sulfate attack on portland cement concrete is considered negligible.[14]

Soil Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of waves, wind and underground water. Excessive soil erosion can eventually lead to damage of building foundations and roadways. In general, areas that are most susceptible to erosion are those that would be exposed during the construction phase when earthwork activities disturb soils and require stockpiling. Typically, the soil erosion potential is reduced once the soil is graded and covered with concrete, structures, asphalt, or landscaping.; however However, changes in drainage patterns can also cause areas to be susceptible to the effects of erosion.

Landslides

Landslides, slope failures, and mudflows of earth materials generally occur where slopes are steep and/or the earth materials are too weak to support themselves. Earthquake-induced landslides may also occur due to seismic ground shaking. According to the geotechnical report, the relatively flat-lying topography at the Project Site precludes both stability problems and the potential for seismically-induced landslides. Also, According according to the Seismic Hazard Zones Map for the Inglewood Quadrangle, the Project Site is not located within areas designated by the State Geologist as susceptible to landslide movement or local topographic, geological, geotechnical and subsurface conditions that indicate a potential for landslides.[15] Furthermore, there are no known landslides near the Project Site, nor is the Project Site in the path of any known or potential landslides. Lastly, the Project Site is not located within an area identified as having a potential for seismic slope instability according to the California Division of Mines and Geology. Therefore, the potential for landslides, slope failures, and mudflows at the Project Site is considered low.

Oil Fields and Methane

As indicated previously, the Project Site is not located within the immediate vicinity of an active or abandoned oil well. The closest known oil production well is located approximately 1,200 feet northeast of the Project Site and is categorized as "idle."

Methane (CH_4) is a naturally occurring colorless gas associated with the decomposition of organic materials. In high-enough concentrations, methane can be considered an explosion hazard. According to the Los Angeles County Department of Public Works Solid Waste Information Management System, the Project Site or its elements are not within 300 feet of an oil

[14] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 33.
[15] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.

or gas well or 1,000 feet of a methane producing site.[16] As such, the potential for explosive methane gases impacting the Project Site appears to be low.

Paleontological Setting

As noted above, the Project Site is located in the Los Angeles Basin, a structural depression approximately 50 miles long and 20 miles wide in the northernmost Peninsular Ranges Geomorphic Province.[17] The Los Angeles Basin developed as a result of tectonic forces and the San Andreas fault zone, with subsidence occurring 18 – 3 million years ago (Ma).[18] While sediments dating back to the Cretaceous (66 Ma) are preserved in the basin, continuous sedimentation began in the middle Miocene (around 13 Ma).[19] Since that time, sediments have been eroded into the basin from the surrounding highlands, resulting in thousands of feet of accumulation.[20] Most of these sediments are marine, as they eroded from surrounding marine formations, until sea level dropped in the Pleistocene Era and deposition of the alluvial sediments that compose the uppermost units in the Los Angeles Basin began.

The Los Angeles Basin is subdivided into four structural blocks, with the Project Site occurring in the Southwestern Block, where alluvial sediments can be 5,000 to 14,000 feet below sea level.[21] The Southwest Block is roughly rectangular, extending from Santa Monica in the northwest to Long Beach to the southeast.[22]

3.6.2 Adjusted Baseline Environmental Setting

Commented [2]: Discuss consistent approach to referencing Adjusted Baseline Environmental Setting and referencing Section 3.0 discussion.

As discussed in Chapter 3, Environmental Impacts, Settings, and Mitigation Measures, the Proposed Project is not anticipated to complete construction and begin operations until mid-2024 for the 2024-25 NBA basketball season. Section 3.6, Geology and Soils, assumes the Adjusted Baseline Environmental Setting described in Chapter 3, Environmental Impacts, Settings, and Mitigation Measures. The projects described in the Adjusted Baseline Environmental Setting will be constructed and in operation prior to opening of the Proposed Project. For this reason, as explained in Chapter 3, Environmental Impacts, Settings, and Mitigation Measures, the City of Inglewood determined that it is appropriate to include these projects in an adjusted environmental setting for the Proposed Project. Due to the certainty that these projects will be constructed and in operation prior to the opening of the Proposed Project, the City has determined that it would be

16 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 12.
17 Ingersoll, R. V. and P. E. Rumelhart, 1999. Three-stage basin evolution of the Los Angeles basin, southern California. Geology 27: 593-596.
18 Critelli, S. P. Rumelhart, and R. Ingersoll, 1995. Petrofacies and provenance of the Puente Formation (middle to upper Miocene), Los Angeles Basin, southern California: implications for rapid uplift and accumulation rates. Journal of Sedimentary Research A65: 656-667.
19 Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder. 1965. Geology of the Los Angeles Basin – an introduction. Geological Survey Professional Paper 420-A.
20 Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder. 1965. Geology of the Los Angeles Basin – an introduction. Geological Survey Professional Paper 420-A.
21 Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder. 1965. Geology of the Los Angeles Basin – an introduction. Geological Survey Professional Paper 420-A, p A14.
22 Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder. 1965. Geology of the Los Angeles Basin – an introduction. Geological Survey Professional Paper 420-A, p. A14.

misleading to disregard these projects in the environmental setting, because these projects are certain to exist by the time the Proposed Project is constructed and commences operations. Accordingly, the changes associated with these developments within the Hollywood Park Specific Plan area are considered as part of the Adjusted Baseline Environmental Setting.

The NFL Stadium and retail/restaurant uses that will be constructed immediately northeast of the intersection of West Century Boulevard and South Prairie Avenue will all be subject to City of Inglewood plan check and building inspection functions which ensures that projects in the City are constructed in accordance with current building code requirements.[23] Construction of these structures are not likely to have any effect on the geotechnical hazards present at the Project Site as geotechnical conditions tend to be site specific, especially in areas with low topographic relief as is the case for the Project Site. In addition, pursuant to the General Construction Permit overseen and enforced by the Los Angeles Regional Water Quality Control Board, construction of the stadium and associated improvements is required to implement best management practices to minimize the potential for erosion and so will not have any material effect on the potential for erosion at the Project Site. There is no evidence that development in the HPSP area would affect the baseline for analysis of the paleontological resources. No resources have been discovered and documented during construction of the HPSP that would provide additional information on the presence or sensitivity of these resources in the area.

3.6.3 Regulatory Setting

Federal

There are no federal regulations, plans, or policies applicable to geology and soils relevant to the Proposed Project.

State

Alquist-Priolo Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code Section 2621) was enacted by the State of California in 1972 to address the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged homes, commercial buildings, and other structures. The primary purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to prevent the construction of buildings intended for human occupancy on the surface traces of active faults. The Alquist-Priolo Earthquake Fault Zoning Act is also intended to provide the citizens with increased safety and to minimize the loss of life during and immediately following earthquakes by facilitating seismic retrofitting to strengthen buildings against ground shaking.

23 The California Building Code is updated on a triennial basis. The current code in effect is the 2016 CBC and the 2019 CBC is anticipated to become effective on January 1, 2020.

The Alquist-Priolo Earthquake Fault Zoning Act requires the State Geologist to establish regulatory "earthquake fault zones" around the surface traces of active faults and to issue appropriate maps to assist cities and counties in planning, zoning, and building regulation functions. Maps are distributed to all affected cities and counties to assist them in regulating new construction and renovations. These maps are required to sufficiently define potential surface rupture or fault creep. The State Geologist is charged with continually reviewing new geologic and seismic data, revising existing zones, and delineating additional earthquake fault zones when warranted by new information. Local agencies must enforce the Alquist-Priolo Earthquake Fault Zoning Act in the development permit process, where applicable, and may be more restrictive than State law requirements. Projects within an earthquake fault zone can be permitted, but only after cities and counties have required a geologic investigation, prepared by licensed geologists, to demonstrate that buildings will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back. Although setback distances may vary, a minimum 50-foot setback is generally required. The Alquist-Priolo Earthquake Fault Zoning Act and its regulations are presented in California Geologic Survey's (CGS) Special Publication (SP) 42, Fault-rupture Hazard Zones in California (2007). The Proposed Project is not located with an Alquist-Priolo Fault Rupture Hazard Zone and therefore would be not be subject to the requirements of the Alquist-Priolo Earthquake Fault Zoning Act.

Seismic Hazards Mapping Act

In order to address the effects of strong ground shaking, liquefaction, landslides, and other ground failures due to seismic events, the State of California passed the Seismic Hazards Mapping Act of 1990 (Public Resources Code Section 2690-2699). Under the Seismic Hazards Mapping Act, the State Geologist is required to delineate "seismic hazard zones." Cities and counties must regulate certain development projects within these zones until the geologic and soil conditions of their project sites have been investigated and appropriate mitigation measures, if any, have been incorporated into development plans. The State Mining and Geology Board provides additional regulations and policies to assist municipalities in preparing the Safety Element of their General Plan and encourage land use management policies and regulations to reduce and mitigate those hazards to protect public health and safety. Under Public Resources Code Section 2697, cities and counties must require, prior to the approval of a project located in a seismic hazard zone, submission of a Geotechnical Report defining and delineating any seismic hazard. Each city or county must submit one copy of each Geotechnical Report, including mitigation measures, to the State Geologist within 30 days of its approval. Under Public Resources Code Section 2698, cities and counties may establish policies and criteria which are stricter than those established by the Mining and Geology Board.

State publications supporting the requirements of the Seismic Hazards Mapping Act include the CGS SP 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California,[24] discussed above, and SP 118, Recommended Criteria for Delineating Seismic Hazard Zones in California (2004).[25] SP 117A provides guidelines to assist in the evaluation and mitigation of earthquake-related hazards for projects within designated zones requiring investigations and to promote uniform and effective Statewide implementation of the evaluation and mitigation elements of the Seismic Hazards Mapping Act.[26] SP 118 provides recommendations to assist the CGS in carrying out the requirements of the Seismic Hazards Mapping Act to produce the Probabilistic Seismic Hazard Maps for the State. The Project Site is not located within a Seismic Hazard Zone for liquefaction or landslides.

California Building Code

The 2016 California Building Code (CBC), Title 24 of the California Code of Regulations, is a compilation of building standards, including seismic safety standards, for new buildings. California Building Code standards are based on building standards that have been adopted by State agencies without change from a national model code; building standards based on a national model code that have been changed to address particular California conditions; and building standards authorized by the California legislature but not covered by the national model code. The CBC applies to all occupancies in California, except where stricter standards have been adopted by local agencies. Specific CBC building and seismic safety regulations have been incorporated by reference into the Los AngelesInglewood Municipal Code (LAMCIMC), with local amendments.

The California Building Code is published on a triennial basis, and supplements and errata can be issued throughout the cycle. The 2016 edition of the California Building Code became effective on January 1, 2017, and incorporates by adoption the 2015 edition of the International Building Code of the International Code Council, with California amendments. The 2016 California Building Code incorporates the latest seismic design standards for structural loads and materials as well as provisions from the National Earthquake Hazards Reduction Program to mitigate losses from an earthquake and provide for the latest in earthquake safety. The 2019 California Building Code is anticipated to become effective on January 1, 2020. The current California Building Code has been adopted by the City with local amendments.

Local

City of Inglewood General Plan

The following goal from the City of Inglewood General Plan is relevant to geology and soils issues:

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24 Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California, prepared by California Geologic Survey, 2008, http://www.conservation.ca.gov/cgs/shzp/webdocs/Documents/sp117.pdf.

25 Special Publication 118, Recommended Criteria for Delineating Seismic Hazard Zones in California, dated May 1992, Revised April 2004, http://www.conservation.ca.gov/cgs/shzp/webdocs/Documents/sp118_revised.pdf.

26 Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California, prepared by California Geologic Survey, 2008, http://www.conservation.ca.gov/cgs/shzp/webdocs/Documents/sp117.pdf.

Safety Element

Goal 1: Provide measures to reduce seismic impacts.

This policy is implemented through ~~Through adherence to~~ the seismic safety requirements of the California Building Code, established in Chapter 11, Article 2 of the City of Inglewood Municipal Code, and which are enforced through plan check and building inspection services administered by the City of Inglewood and imposed on the Proposed Project. ~~, the Proposed Project would not be inconsistent with this policy.~~

Commented [3]: Add conclusion and reference to final decision by the City, per standard language from other sections.

3.6.4 Analysis, Impacts and Mitigation

Significance Criteria

The City has not adopted thresholds of significance for analysis of impacts to geology and soils. The following thresholds of significance have been adapted from CEQA Guidelines section 15065 and CEQA Guidelines Appendix G. A significant impact would occur if the Proposed Project would:

1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42;
   ii. Strong seismic ground shaking;
   iii. Seismic-related ground failure, including liquefaction; or
   iv. Landslides.
2. Result in substantial soil erosion or the loss of topsoil;
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
5. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water; or
6. Directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Paleontological Resources Significance Criteria

Fossils are considered to be of significant scientific interest if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.[27]

Significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically important. Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy. Assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, and paleoclimatology are also critically important.[28,29]

Methodology and Assumptions

The potential for creation of significant impacts related to geology and soils through construction and operation of the Proposed Project were determined by a thorough review of the existing conditions that were informed by the geotechnical report prepared for the Project Site,[30] and data from the US Geological Survey, California Geological Survey, and Southern California Earthquake Data Center.

Paleontological Resources

The analysis of paleontological resources is based on the Paleontological Resources Assessment Report (Appendix X), which includes a review of the Natural History Museum of Los Angeles County (LACM) paleontological records search results and other documentation regarding disturbances to the Project Site and its subsurface geological conditions. The objective of the

[27] Scott, E. and K. Springer, 2003. CEQA and Fossil Preservation in California. The Environmental Monitor.
[28] Scott, E. and K. Springer, 2003. CEQA and Fossil Preservation in California. The Environmental Monitor.
[29] Scott, E., K. Springer, and J. C. Sagebiel, 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of "follow-through" in preserving paleontologic resources. In The human journey and ancient life in California's deserts: Proceedings from the 2001 Millennium Conference. Ridgecrest: Maturango Museum Publication 15: 65-70.
[30] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018.

record search through the LACM was to determine the geological formations underlying the Project Site, whether any paleontological localities have previously been identified within the Project Site or in the same or similar formations near the Project Site, and the potential for excavations associated with the Project to encounter paleontological resources. These methods are consistent with the Society for Vertebrate Paleontology (SVP) guidelines for assessing the importance of paleontological resources in areas of potential environmental effect.

There are no plans, policies, or regulations with which the project is required to comply with regard to treatment of paleontological resources. However, it is accepted professional practice to recognize standard guidelines promulgated by the SVP that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological resource-specific Laws, Ordinances, Regulations, and Standards (LORS) accept and use the professional standards set forth by the SVP.

As defined by the SVP,[31] significant nonrenewable paleontological resources are:

> Fossils and fossiliferous deposits here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate or paleobotanical fossils except when present within a given vertebrate assemblage. Certain invertebrate and plant fossils may be defined as significant by a project paleontologist, local paleontologist, specialists, or special interest groups, or by lead agencies or local governments.

As defined by the SVP,[32] significant fossiliferous deposits are:

> A rock unit or formation which contains significant nonrenewable paleontologic resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces, and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways, or nests and middens which provide datable material and climatic information). Paleontologic resources are considered to be older than recorded history and/or older than 5,000 years BP [before present].

Based on the significance definitions of the SVP,[33] all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate

[31] Society of Vertebrate Paleontology (SVP), 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.
[32] Society of Vertebrate Paleontology (SVP), 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.
[33] Society of Vertebrate Paleontology (SVP), 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.

fossils are relatively uncommon, and 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 geologic 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 to be "sensitive" to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either directly or indirectly disturb or destroy fossil remains. Paleontological sites indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case.[34]

Fossils are contained within surficial sediments or 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 assess 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 in order to prevent adverse impacts to these resources.

Paleontological Sensitivity

Paleontological sensitivity 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 sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its "Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources," the SVP[35] defines four categories of paleontological sensitivity (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

[34] Society of Vertebrate Paleontology (SVP), 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.

[35] Society of Vertebrate Paleontology (SVP). 2010. Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_ Mitigation_Guidelines.aspx Accessed January 3, 2017.

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.).

- **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 paleontologic potential of the rock units present within the study area.

Geologic Map & Paleontological Literature Review

Geologic mapping by Dibblee and Minch[36] indicates that the Project Site is underlain with Pleistocene-aged older alluvium (mapped as Qoa). However, as noted above, the geotechnical investigation determined that the older alluvium was encountered at the Project Site at depths of 30 to 40 feet bgs and overlain by younger alluvium (mapped as Qa and dated within Holocene age – up to 11,700 years).[37] The geotechnical report does not reconcile the discrepancy between

36 Dibblee, T. W. and T. Minch, 2007. Geologic map of the Venice and Inglewood quadrangles, Los Angeles County, California. Dibblee Foundation Map DF-322. 1:24,000.

37 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 10.

the Dibblee mapping which was referenced in the report and their identification of the native materials. Thus, for the purposes of providing a conservative analysis, the paleontological analysis assumes that the native materials encountered across the Project site consisted of the Older alluvium. These sediments consist of pebble-gravel, sand, and silt-clay deposited from erosion of the surrounding highlands that has since been dissected by recent erosion.[38] Older alluvium is poorly constrained in age, but is generally considered to have been deposited during the Pleistocene, 11,700 to 2.58 Ma.[39]

These sediments are old enough to preserve fossil resources (i.e., over 5,000 years, as per the SVP,[40] and have a rich fossil history in Los Angeles[41,42] and throughout southern California.[43,44,45,46,47,48] The most common fossils include the bones of mammoth, bison, horse, lion, cheetah, wolf, camel, antelope, peccary, mastodon, capybara, and giant ground sloth, as well as small animals such as rodents and lizards.[49] In addition to illuminating the striking differences between Southern California in the Pleistocene and today, this abundant fossil record has been vital in studies of extinction,[50,51] ecology,[52] and climate change.[53]

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38 Dibblee, T. W. and T. Minch, 2007. Geologic map of the Venice and Inglewood quadrangles, Los Angeles County, California. Dibblee Foundation Map DF-322. 1:24,000.

39 Dibblee, T. W. and T. Minch, 2007. Geologic map of the Venice and Inglewood quadrangles, Los Angeles County, California. Dibblee Foundation Map DF-322. 1:24,000.

40 Society of Vertebrate Paleontology, 2010. Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx Accessed January 3, 2017.

41 Brattstrom, B. H. and A. Sturn, 1959. A new species of fossil turtle from the Pliocene of Oregon, with notes on other fossil Clemmys from western North America. Bulletin of the Southern California Academy of Sciences 58:65-71).

42 Steadman, D. W., 1980. A Review of the osteology and paleontology of turkeys (Aves: Meleagridinae). Contributions in Science, Natural History Museum of Los Angeles County 330:131-207.

43 Hudson, D. and B. Brattstrom, 1977. A small herpetofauna from the Late Pleistocene of Newport Beach Mesa, Orange County, California. Bulletin of the Southern California Academy of Sciences 76: 16-20.

44 Jefferson, G.T., 1991. A catalogue of Late Quaternary Vertebrates from California: Part One, nonmarine lower vertebrate and avian taxa. Natural History Museum of Los Angeles County Technical Reports No. 5.

45 Jefferson, G.T., 1991. A catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals. Natural History Museum of Los Angeles County Technical Reports No. 7.

46 McDonald, H. G. and G. T. Jefferson, 2008. Distribution of Pleistocene Nothrotheriops (Xenartha, Nothrotheridae) in North America. In: Wang, X. and L. Barnes, eds., Geology and Vertebrate Paleontology of Western and Southern North America. Natural History Museum of Los Angeles County Science Series 41: 313-331.

47 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, No. 10.

48 Springer, K., E. Scott, J. Sagebiel, and L. Murray, 2009. The Diamond Valley Lake local fauna: late Pleistocene vertebrates from inland southern California. In: Albright, L., ed., Papers on Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin 65: 217-237.

49 Graham, R.W., and E.L. Lundelius, 1994. FAUNMAP: A database documenting the late Quaternary distributions of mammal species in the United States. Illinois State Museum Scientific Papers XXV(1).

50 Sandom, C., S. Faurby, B. Sandel, and J.-C. Svenning, 2014. Global late Quaternary megafauna extinctions linked to humans, not climate change. Proceedings of the Royal Society B 281, 9 p.

51 Barnosky, A., C. Bell, S. Emslie, H. T. Goodwin, J. Mead, C. Repenning, E. Scott, and A. Shabel, 2004. Exceptional record of mid-Pleistocene vertebrates helps differentiate climatic from anthropogenic ecosystem perturbations. Proceedings of the National Academy of Sciences 101: 9297-9302.

52 Connin, S., J. Betancourt, and J. Quade, 1998. Late Pleistocene C4 plant dominance and summer rainfall in the Southwestern United States from isotopic study of herbivore teeth. Quaternary Research 50: 179-193.

53 Roy, K., J. Valentine, D. Jablonski, and S. Kidwell, 1996. Scales of climatic variability and time averaging in Pleistocene biotas: implications for ecology and evolution. Trends in Ecology and Evolution 11: 458-463.

Issues Previously Determined to be Less Than Significant

Upon review of the Proposed Project, the City of Inglewood has determined that due to the physical characteristics of the Project Site and the design of the Proposed Project, several environmental issues or resources addressed in geology and soils significance criteria would not be affected by the Proposed Project and need not be further considered in the Draft EIR.[54] The discussions below provide statements of reasons for the City's determination that these issues do not warrant further consideration in the EIR.

In December 2015, the California Supreme Court found that "agencies subject to CEQA generally are not required to analyze the impact of existing environmental conditions on a project's future users or residents." In *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369, 392, the Supreme Court explained that except under a limited number of circumstances specifically identified in CEQA, an agency is only required to analyze the potential impact of such hazards on future residents if the project would exacerbate those existing environmental hazards or conditions. CEQA analysis is therefore concerned with a project's impact on the environment, rather than with the environment's impact on a project and its users or residents. Thus, with respect to geologic and seismic hazards, the City is not required to consider the effects of bringing people or structures into an area where such hazards exist, because the project itself would not exacerbate or otherwise affect the geologic conditions that create those risks. Nonetheless, in order to provide a complete picture of the Proposed Project, these impacts are discussed below.

The Proposed Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving the rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (No Impact)

No known active, sufficiently active, or well-defined faults have been recognized as crossing or being immediately adjacent to the Project Site.[55,56] The California Geological Survey (CGS) does not delineate any part of the Project Site as being within an Alquist-Priolo Earthquake Fault Zone. The Alquist-Priolo Earthquake Fault Zone closest to the Project Site is the Newport-Inglewood Fault, located approximately 1.13 miles to the northwest.[57] Since there are no active faults on or adjacent to the Project Site, the Proposed Project would not expose people or structures to

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54 Public Resources Code section 21003(e) states that "[t]o provide more meaningful public disclosure, reduce the time and cost required to prepare an environmental impact report, and focus on potentially significant effects on the environment of a proposed project, lead agencies shall, in accordance with Section 21100, focus the discussion in the environmental impact report on those potential effects on the environment of a proposed project which the lead agency has determined are or may be significant. Lead agencies may limit discussion on other effects to a brief explanation as to why those effects are not potentially significant."

55 A sufficiently active fault is "one that has evidence of Holocene surface displacement along one or more of its segments or branches."

56 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 16.

57 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 16.

potential substantial adverse effects, including the risk of loss, injury, or death involving the rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the California State Geologist for the area. Further, there is no evidence that development of the Proposed Project would exacerbate the frequency or effects of seismic activity in the area. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

The Proposed Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic groundshaking. (No Impact)

Strong Seismic Ground Shaking

The Project Site is located in a seismically active region with numerous active faults. The Newport-Inglewood Fault is the active fault closest to the Project Site, which is approximately 1.13 miles to the northwest.[58] Given the proximity of known faults, there is potential for high-intensity groundshaking associated with the earthquakes in this region. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the strength and duration of shaking, and the nature of the geologic materials on which the Proposed Project would be constructed. The geologic material on which the Proposed Project would be constructed would be removed, compacted, or replaced as necessary pursuant to further subsurface investigations of areas where near-surface structures are planned.[59] All fill and backfill materials would be observed and tested by the geotechnical engineer prior to their use in order to evaluate their suitability. The properties of fill and backfill material that would be investigated may include grain size, shear strength, compressibility, expansion, compaction, and corrosivity characteristics.[60]

The structural elements of the Proposed Project would be required to undergo appropriate design-level geotechnical evaluations prior to final design and construction in accordance with Chapter 18 of the California Building Code (CBC). Implementing the regulatory requirements of the most recent California Building Code (CBC), currently 2016 but 2019 CBC likely goes into effect January 1, 2020, County and City ordinances, the CGS Guidelines for Evaluating and Mitigating Seismic Hazards in California, and ensuring all buildings and structures are constructed in compliance with the law is the responsibility of the project engineers and building officials as also detailed in Chapter 18 of the CBC. The two proposed pedestrian footbridges would utilize cast-in-drilled-hole piles (CIDH) or spread footings. Construction of the pedestrian footbridges would undergo the same geotechnical investigations to ensure that the soil or fill is suitable to support the pedestrian footbridges; any unsuitable material would be excavated and compacted until suitable.[61] Compliance with the CBC and local ordinances would minimize the potential for damage from strong seismic ground shaking. The Proposed Project would not expose people or

Commented [4]: Confirm actual effective date is Jan 1, 2020.

58 AECOM, 2018. Preliminary Geotechnical Investigation, Project Condor, August 23, 2018. Page 16.
59 AECOM, 2018. Preliminary Geotechnical Report for Murphy's Bowl LLC. Page 22.
60 AECOM, 2018. Preliminary Geotechnical Report for Murphy's Bowl LLC. Page 24.
61 AECOM, 2018. Preliminary Geotechnical Report for Murphy's Bowl LLC. Page 22.

structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Further, there is no evidence that development of the Proposed Project would exacerbate the frequency or effects of seismic activity in the area. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

The Proposed Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction. (No Impact)

Liquefaction occurs when saturated, granular soils lose their inherent shear strength due to excess pore water pressure build-up, such as that generated during repeated cyclic loading from an earthquake. Factors that contribute to liquefaction include low relative density and loose consistency of soils, shallow groundwater tables, and long duration and high acceleration of seismic ground shaking. The Project Site is not within a liquefaction zone area as mapped by the CGS, as shown in the Earthquake Zones of Required Investigation Map, Inglewood Quadrangle.[62] The historic high groundwater level beneath the Project Site is reported as 50 feet below the existing ground surface, and the Project Site is characterized by the presence of dense to very dense and very stiff to hard soils.[63] The Proposed Project would not exposure people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction. Further, there is no evidence that development of the Proposed Project would exacerbate the frequency or effects of seismic activity in the area. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

The Proposed Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. (No Impact)

The Project Site and its surrounding area are relatively flat, with gentle slopes from east to west and north to south, depending on the parcel. The Project Site is not within areas designated by the State Geologist where previous landslide movement has occurred.[64] The Project Site is also not mapped within areas designated as having the potential for seismically induced landslides.[65] Local topographic, geological, geotechnical, and subsurface conditions indicate that the potential for permanent ground displacement, such as a landslide, is minimal.[66] The Proposed Project would not exposure people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. Further, there is no evidence that development of the Proposed Project would exacerbate the potential occurrence of landslides. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

62 California Geological Survey (CGS), 1999. Earthquake Zones of Required Investigation Inglewood Quadrangle, released March 25, 1999.
63 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.
64 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.
65 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 18.
66 AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.

The Proposed Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse. (No Impact)

Collapsible soils undergo settlement upon wetting, even without the application of additional load. Water weakens the bonds between soil particles and reduces the bearing capacity of the soil. Collapsible soils are typically lightly colored, have low plasticity, and relatively low densities. The Project Site fill soils are expected to be predominantly clayey, which are not soil properties that typically lead to collapsible soils.

Subsidence is the gradual settling or sinking of the ground, most often caused by the removal of water, oil, natural gas, or mineral resources from the ground. There is no historic evidence of subsidence in the City of Inglewood, and no major extraction of water or petroleum is planned in the vicinity of the Project Site in the future. The historic high groundwater level beneath the Project Site is reported as 50 feet below the existing ground surface. Excavations of up to 35 feet below the existing ground surface may be required during project construction. Given the depth of excavation and the depth of groundwater, it is expected that no dewatering would occur during construction of the Proposed Project. The risk of subsidence is minimal.

Lateral spread displacement can occur during strong earthquakes, especially when conditions such as free-face, sloping ground surfaces and liquefiable layers are present. The Project Site does not have unsupported free-face, sloping ground surfaces, and has a very low susceptibility of liquefaction. The risk of lateral spreading is minimal.

The Proposed Project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and would not result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. Further, there is no evidence that development of the Proposed Project would exacerbate the potential for landslides, lateral spreading, subsidence, liquefaction, or collapse. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

The Proposed Project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property. (No Impact)

Expansive soils are fine-grained soils that can undergo a significant increase in volume with an increase in water content and a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures constructed upon the soil. The Proposed Project would increase the amount of impervious surface on the Project Site, thereby reducing the amount of stormwater that directly percolates into the soil and reduces the potential for soil expansion. The Project Site includes areas that are underlain by clayey soils that could exhibit expansion potential when not properly addressed during site preparations in construction.[67] Regardless, the structural elements of the Proposed Project would be required to undergo appropriate design-level geotechnical evaluations prior to final design and construction which would include any necessary measures such as removal of expansive soils, if present, to ensure that expansive soil hazards are minimized. Implementing the regulatory requirements of the California Building Code (CBC), County and City ordinances, the CGS Guidelines for Evaluating and Mitigating Seismic Hazards in California, and ensuring all buildings and structures are constructed in compliance with the law is the responsibility of the project engineers and building officials. Therefore, with implementation of the recommendations from the final design-level geotechnical report in accordance with building code requirements, would eliminate the potential for adverse effects from expansive soils. Further, there is no evidence that development of the Proposed Project would exacerbate the potential for expansive soils to damage other properties in the area. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

The Proposed Project would not have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems where sewers are not available for the disposal of waste water. (No Impact)

The Proposed Project would not include the use or construction of any septic tank or alternative wastewater disposal systems. All proposed sewer impacts would involve connections to existing service systems, as discussed further in Section 3.15, Utilities and Service Systems. Further, there is no evidence that development of the Proposed Project would damage or in other ways adversely affect septic tanks or alternative waste disposal systems in the area. Thus, there would be **no impact** of the Proposed Project related to this significance criterion.

Impacts and Mitigation Measures

Impact 3.6-1: Implementation of the Proposed Project could result in the substantial erosion or the loss of topsoil. (Less than Significant)

Erosion of exposed soils can occur as a result of the forces of wind or water, and can be exacerbated through ground disturbing activities that take place during project construction. Substantial earth work and excavation would occur during Project construction. Additionally, the Project Site would change from largely soil surfaces to developed hardscape areas.

Projects that disturb more than one acre of land during construction, such as the Proposed Project, are required to file a Notice of Intent (NOI) with the State Water Resources Control Board (SWRCB) to be covered under the National Pollution Discharge Elimination System (NPDES) Construction General Permit for discharges of stormwater associated with construction activity. In addition, Chapter 10, Article 16, Section 10-208(H.1) of the City of Inglewood Municipal Code (Low Impact Development Requirements for New Development and Redevelopment) establishes that the City is required to evaluate the Proposed Project's consistency with the MS4

Commented [5]: Either add discussion of the SWRCB/NPDES and Municipal Code LID requirements to the Regulatory Setting section of this chapter, or cross reference the discussion of them in the Hydrology & Water Quality chapter's Regulatory Setting section.

[67] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.

Permit [explain what this is], and *erosion* and grading requirements of the City Building Official or Authorized Enforcement Officer. Based upon the City's review, it has the discretion to impose conditions upon the issuance of the building permit, in addition to any required by the State Construction General Permit for the project, in order to minimize the flow of pollutants into the City's municipal stormwater system.

Commented [6]: Why italicized?

The project proponent must develop measures that are consistent with the Construction General Permit, such as the preparation of a Stormwater Pollution Prevention Plan (SWPPP). Prior to construction of the Proposed Project, the project applicant would be required to prepare a SWPPP, which would describe best management practices (BMPs) that would be implemented to reduce runoff and subsequent erosion. The SWRCB also issues the NPDES Municipal Separate Storm Sewer System (MS4) Permit. The MS4 permit imposes a number of basic programs, called Minimum Control Measures, on all permittees in order to maintain a level of acceptable runoff conditions through the implementation of practices, devices, or designs generally referred to as BMPs, that mitigate stormwater quality problems, including erosion, during construction and operational phases of a project. During construction of the Proposed Project, all activities would be required to adhere to the applicable BMPs that would be prescribed in order to prevent erosion and runoff during construction. Therefore, adherence to these NPDES requirements would ensure that erosion control BMPs are implemented during construction which would reduce potential impacts to less than significant levels.

With implementation of the Proposed Project, it is estimated that approximately 90 percent of the Project Site would be covered by impervious surfaces (an increase from approximately 15 percent under Adjusted Baseline Environmental Setting conditions). During operation of the Proposed Project, most of the Project Site would be covered with impervious surfaces such as asphalt or concrete that include required drainage control measures consistent with NPDES MS4 requirements such that the potential for erosion or loss of topsoils would be reduced to less than significant levels. Further, through compliance with the County's Low Impact Development (LID) Standards Manual, the proposed project would utilize a combination of County standard bio-filtration planters and bio-filtration systems to treat the stormwater. Runoff would be directed from drainage areas to onsite bio-filtration plants and bio-swales. The bio-filtration systems would be designed to capture site runoff from roof drains, treat the runoff through biological reactions within the planter soil media, and discharge at a rate intended to mimic pre-developed conditions. Given the developed nature of the Proposed Project, the Project Site would not be readily susceptible to erosion.[68] Overall, the Proposed Project would not result in substantial soil erosion or the loss of topsoil, on- or off-site. The impact would be **less than significant**. Erosion is further discussed in Section 3.9, Hydrology and Water Quality, under Impact 3.9-3.

Mitigation Measures

None required.

[68] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018. p. 11.

Impact 3.6-2: Implementation of the Proposed Project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant with Mitigation)

A direct effect on a unique paleontological resource would result in the direct damage or destruction of such a resource. Indirect impacts are not specifically caused by a development project, but may be a reasonably foreseeable result of such a project. Typical indirect impacts to paleontological resources include destruction or loss of surface fossils from increased erosion or the non-scientific or unauthorized surface collection or subsurface excavation of a fossil or paleontological site. ~~Following t~~The guidelines of the SVP,[69,70] a review of the scientific literature and geologic mapping, ~~as well as~~ and the records search from LACM~~,~~ ~~was~~ were used to assign paleontological sensitivities to the geologic units present in the subsurface of the Project Site that would be subject to ground-disturbing activities. As noted above [where?], the geotechnical investigation determined that the site is underlain by approximately 5 to 10 feet of artificial fill materials before alluvial soils are encountered. As a result of this study, the subsurface sediments of the Project Site identified as Older Quaternary Alluvium, present at depths ranging from 30 to 40 feet bgs, are assigned high paleontological sensitivity, as they have a proven record throughout Los Angeles of containing scientifically significant fossils. Although no known resources were identified within the Project Site from the LACM search, this does not preclude the possibility of previously unknown buried paleontological resources within the Project Site that may be impacted during construction. The potential to encounter paleontological resources during construction was determined by reviewing the results of the records search, the depth of native versus fill soils, land use history, past disturbances, and the proposed excavation parameters for the Project.

A wide variety of Ice Age fossils are known from these sediments across the Los Angeles Basin, as reviewed above [where?], including multiple specimens belonging to ten taxa known from within 2- to 4-miles of the Project Site.[71] Excavation within the Arena Site, ~~subsurface parking~~the West Parking and Transportation Hub Site, and the East Parking and H~~h~~otel S~~s~~ite, during construction is planned at depths of up to 35 feet bgs, which could impact Older Quaternary Alluvium determined to have a high sensitivity for fossils. As a result, Project construction would have the potential to directly or indirectly destroy a previously unknown unique paleontological resource not identified in the analysis conducted for the Project. This would be considered a **potentially significant impact**.

Commented [7]: Conform to final names for sites.

69 Society of Vertebrate Paleontology, 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.

70 Society of Vertebrate Paleontology, 2010. Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources. Available: http://vertpaleo.org/Membership/Member-Ethics/SVP_Impact_Mitigation_Guidelines.aspx Accessed January 3, 2017.

71 McLeod, S. 2018. Re: Paleontological resources for the proposed Clippers Arena Project, Project # 171236.00, in the City of Inglewood, Los Angeles County, project area. Letter response to Vanessa Ortiz. May 8, 2018.

<u>Mitigation Measures</u>

Mitigation Measure 3.6-2

a) A qualified paleontologist meeting the Society of Vertebrate Paleontology (SVP) Standards (SVP, 2010) shall be retained by the project applicant and approved by the City prior to the approval of grading permits. The qualified paleontologist shall:

i. Prepare, design, and implement a monitoring and mitigation program for the project consistent with Society of Vertebrate Paleontology Guidelines. The Plan shall define pre-construction coordination, construction monitoring for excavations based on the activities and depth of disturbance planned for each portion of the Project Site, data recovery (including halting or diverting construction so that fossil remains can be salvaged in a timely manner), fossil treatment, procurement, and reporting. The ~~Plan~~ monitoring and mitigation program shall be prepared and approved by the City prior to the issuance of the first grading permit. If the qualified paleontologist determines that the project grading and excavation activity will not affect Older Quaternary Alluvium, then no further mitigation is required.

ii. Conduct construction worker paleontological resources sensitivity training at the Project kick-off meeting prior to the start of ground disturbing activities (including vegetation removal, pavement removal, etc.) and will present the Plan as outlined in (~~b~~a)i.). In the event construction crews are phased or rotated, additional training shall be conducted for new construction personnel working on ground-disturbing activities. The training session shall provide instruction on the recognition of the types of paleontological resources that could be encountered within the Project Site and the procedures to be followed if they are found. Documentation shall be retained by the qualified paleontologist demonstrating that the appropriate construction personnel attended the training.

Commented [8]: Confirm edit.

iii. Direct the performance of paleontological resources monitoring by a qualified paleontological monitor (meeting the standards of the SVP, 2010). Paleontological resources monitoring shall be conducted pursuant to the monitoring and mitigation program developed under (i), above. Monitoring activities may be altered or ceased if determined adequate by the qualified paleontologist. Monitors shall have the authority to, and shall temporarily halt or divert work away from exposed fossils or potential fossils, and establish a 50-foot radius temporarily halting work around the find. Monitors shall prepare daily logs detailing the types of ground disturbing activities and soils observed, and any discoveries.

iv. If fossils are encountered, determine their significance, and, if significant, supervise their collection for curation. Any fossils collected during Project-related excavations, and determined to be significant by the qualified paleontologist, shall be prepared to the point of identification and curated into an accredited repository with retrievable storage.

v. Prepare a final monitoring and mitigation report for submittal to the City in order to document the results of the paleontological monitoring. If there are *significant discoveries, fossil locality information and final disposition shall be included with the final report which will be submitted to the appropriate repository and the City. The final monitoring report shall be submitted to the City within 90 days of completion of excavation and other ground disturbing activities that could affect Older Quaternary Alluvium.*

Level of Significance After Mitigation: Implementation of Mitigation Measure 3.6-2(a) through (e) would ensure that paleontological resources would be identified before they had been damaged or destroyed, and then properly evaluated and treated. Thus, the impact would be considered **less than significant**.

Cumulative Impacts

The geographic scope considered for the cumulative analysis is the Torrance Plain, the alluvial plain located within the southwest block of the Los Angeles Basin, for the issue of erosion and loss of topsoil. The Torrance Plain developed by uplift and deposition of sediments derived from the erosion of the uplands including the Santa Monica Mountains.[72] The geographic scope for paleontology resources is the Southwestern Block of the Los Angeles Basin which is one of four structural blocks in the Basin that contains the Project Site. According to geologic mapping, the Southwestern Block includes the Pleistocene-aged (11,700 to 2.58 million years ago) Older Alluvium which has a rich fossil history in the Los Angeles Basin.

Impact 3.6-3: Implementation of the Proposed Project in combination with related cumulative projects could result in substantial erosion or loss of topsoil. (Less than Significant)

Development activities associated with the cumulative projects found in Table 3.0-2, many of which located within the Torrance Plain, include past, present, and reasonably foreseeable projects which have construction components that include earthwork activities. These ground disturbing activities could expose soils in a manner that lead to increased erosion if not managed properly. Such erosion could cause unstable ground surfaces and result in eventual damage to roads, foundations and other improvements. Cumulative effects of increased erosion on receiving water quality is addressed in Section 3.9, Hydrology and Water Quality, Impact 3.9-7.

Construction activities at the Project Site as well as other current and future cumulative projects greater than one (1) acre in size, which would apply to the vast majority of the cumulative projects, are required to comply with the NPDES Construction General Permit which contains erosion control requirements that would minimize the potential for soil erosion. The NPDES program requires the preparation and implementation of Stormwater Pollution Prevention Programs (SWPPPs) for construction activities that include BMPs that ensure erosion control measures are included during construction. All cumulative projects, including the Proposed Project, would be required to comply with these regulations, as would other nearby reasonably

[72] AECOM, 2018. Preliminary Geotechnical Investigation, September 14, 2018, p. 10.

foreseeable development and other construction projects. In addition, once construction is completed the cumulative projects such as the apartment ~~developments~~, commercial ~~developments~~, hotel~~s, and~~ office ~~complexes~~, and various other developments identified in Table 3.0-2 would generally all include the cover of site soils with either landscaping or impervious surfaces which limits the potential for erosion.

As shown in Figure 3.0-1, the cumulative projects that are located throughout the Torrance Plain are primarily within urban areas and within highly developed areas where previous development has disturbed surface soils to the point where native topsoil has largely been reworked or covered by artificial fill similar to the Project site. As noted above, the geotechnical investigation determined that the Project site is underlain by approximately 5 to 10 feet of artificial fill materials. Therefore, considering that the Project Site is underlain by artificial fill at the surface there would be no potential for the Project to contribute to a cumulative impact related to loss of topsoil.

~~Therefore, because the related cumulative projects would not exacerbate the effect of t~~The Proposed Project would not make a cumulatively considerable contribution to a significant cumulative impact related to erosion or loss of topsoil, ~~the Proposed Project's contribution to a significant cumulative impact would not be considerable,~~ and therefore, impacts would be **less than significant**.

Mitigation Measures

None required.

Impact 3.6-4: Implementation of the Proposed Project, in combination with related cumulative projects, would contribute to cumulative impacts on paleontological resources. (Less than Significant with Mitigation)

Projects within the Project vicinity and within the Southwestern Block of the Los Angeles Basin could also be within Quaternary-aged terrestrial and shallow marine sediments overlying Tertiary-aged marine sediments which have been found to contain significant fossil resources. The majority of the current and future development contained with Table 3.0-2 include subsurface disturbances for the construction of foundations and utilities which increases the likelihood that paleontological resources could be uncovered, and it is therefore possible that cumulative development would result in the demolition or destruction of significant paleontological resources. This potential loss of resources is considered a significant cumulative impact. The Proposed Project could contribute to this impact if paleontological resources are located beneath the Project Site and damaged or destroyed during the excavation process. In that event, the Proposed Project's contribution to the significant cumulative impact would be cumulatively considerable.

Mitigation Measures

Mitigation Measure 3.6-4

Implement Mitigation Measure 3.6-2.

Level of Significance After Mitigation: Mitigation Measure 3.6-2 would lessen the Project contribution toward the loss of paleontological resources by requiring that work stop if such resources are discovered until the resource can be evaluated, collected, properly treated, and curated with accredited repository with retrievable storage. With implementation of this mitigation measure, the Proposed Project contribution to the cumulative loss of paleontological resources would be less than cumulatively considerable, and therefore this cumulative impact would be **less than significant** with mitigation.