IV. Environmental Impact Analysis

D. Geology and Soils

1. Introduction

This section discusses the geologic conditions at the Project Site and vicinity as they relate to potential geologic hazards and paleontological resources. This section is based, in part, on information and findings presented in the Geotechnical Engineering Evaluation Report (Preliminary Geotechnical Report) prepared for the Project by Twining Consulting and provided in Appendix F-1 of this Draft EIR.[1] The analysis provided in this section regarding paleontological resources is based on the Paleontological Resources Assessment Report prepared by ESA, provided in Appendix F-2 of this Draft EIR.[2]

2. Environmental Setting

a) Regulatory Framework

(1) Federal

(a) Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Earthquake Hazards Reduction Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was substantially amended by the NEHRP Reauthorization Act of 2004 (Public Law 108-360).

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency (FEMA) as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide local planning and building code requirements such as emergency

[1] Twining Consulting, *Geotechnical Engineering Evaluation Report (Preliminary Geotechnical Report)*, October 30, 2018. Provided in Appendix F-1 of this Draft EIR.

[2] ESA, 670 Mesquit Project, City of Los Angeles, California, *Paleontological Resources Assessment Report (Paleontological Resources Assessment Report)*, August 2020. Provided in Appendix F-2 of this Draft EIR.

evacuation responsibilities and seismic code standards such as those to which a proposed project would be required to adhere.

(b) National Pollutant Discharge Elimination System (NPDES)

The NPDES Program has been responsible for substantial improvements to our nation's and state's water quality since 1972. The NPDES permit sets erosion control standards and requires implementation of nonpoint source control of surface drainage through the application of a number of Best Management Practices (BMPs). NPDES permits are required by Section 402 of the Clean Water Act.[3]

(c) Paleontological Resources Preservation Act

The Paleontological Resources Preservation Act (PRPA) was signed into law in 2009. It directs the Department of Agriculture and the Department of the Interior to implement comprehensive paleontological resource management programs on federal lands. The PRPA protects scientifically significant fossils on federal lands and provides a permitting system where researchers can collect and study scientifically significant fossils which will remain in the public trust. The act also allows for the collection of common plant and invertebrate fossils for personal, non-commercial use on federal lands.[4] The PRPA requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal land. The PRPA furthers the protection of fossils on federal lands by criminalizing the unauthorized removal of fossils.

(d) Society for Vertebrate Paleontology Standard Guidelines

The Society for Vertebrate Paleontology (SVP) has established standard guidelines[5] 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. The Paleontological Resources Preservation Act (PRPA) of 2009 calls for uniform policies and standards that apply to fossils on all federal public lands. All federal land management agencies are required to develop regulations that satisfy the stipulations of the PRPA. As defined by the SVP,[6] significant nonrenewable paleontological resources are:

> *Fossils and fossiliferous deposits here are 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*

[3] United States Environmental Protection Agency (USEPA), *Clean Water Act*, Section 402: National Pollutant Discharge Elimination System, https://www.epa.gov/cwa-404/clean-water-act-section-402-national-pollutant-discharge-elimination-system. Accessed February 2, 2021.

[4] United States Department of the Interior, National Park Service, *Paleontological Resources Preservation Act*.

[5] Society of Vertebrate Paleontology (SVP), Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources, 2010.

[6] SVP, Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines, *Society of Vertebrate Paleontology News Bulletin 163*:22–27, 1995.

> *paleontologist, specialists, or special interest groups, or by lead agencies or local governments.*

As defined by the SVP,[7] 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,[8] all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate 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.

(2) State

(a) Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code [PRC] Section 2621, et seq.) was enacted by the State of California in 1972 to address the hazards related to surface faulting and the impacts to structures, particularly those used for human occupancy.[9] 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 regulate development near active faults so as to mitigate the hazard of surface fault rupture.

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

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

9 The Act was originally entitled the Alquist-Priolo Geologic Hazards Zone Act.

The Alquist-Priolo Earthquake Fault Zoning Act requires the State Geologist to establish regulatory "earthquake fault zones"[10] around the surface traces of Holocene-active faults and to issue appropriate maps to assist cities and counties in planning, zoning, and building regulation functions. The State Geologist distributes maps to all affected cities and counties to assist them in regulating new construction and renovations. These maps are required to 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 or within 50 feet of the trace of the fault and must be set back a minimum distance established by the local city or county.

The Alquist-Priolo Earthquake Fault Zoning Act and its regulations are presented in the California Geological Survey's (CGS) Special Publication (SP) 42, Fault-Rupture Hazard Zones in California.[11] In addition to providing a source and background information for Earthquake Fault Zone maps, the revised 2018 version also provides state-of-the-practice guidelines for affected permitting agencies and their reviewers, geoscience consulting practitioners, property owners, and developers.

(b) 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 (PRC Sections 2690–2699), which requires the State Geologist 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 those hazards to protect public health and safety. Under PRC 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 PRC Section 2698, cities and counties may establish policies and criteria which are stricter

[10] California Geological Survey (CGS) policy since 1977 is to position the earthquake fault zone boundary about 500 feet away from major active faults and about 200 to 300 feet away from well-defined, minor faults. Exceptions to this policy exist where faults are locally complex or where faults are not vertical.

[11] CGS, Earthquake Fault Zones, *A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*, Special Publication 42, 2018.

than those established by the Mining and Geology Board. Regarding assessment of seismic hazards, PRC Section 2699 requires that a general plan safety element take into account available seismic hazard maps prepared by the State Geologist pursuant to the Alquist-Priolo Earthquake Fault Zoning Act.

State publications supporting the requirements of the Seismic Hazards Mapping Act include CGS SP 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California, (SP 117A),[12] and CGS SP 118, Recommended Criteria for Delineating Seismic Hazard Zones in California. (SP 118).[13] 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.[14] SP 118 provides recommendations to assist CGS in carrying out the requirements of the Seismic Hazards Mapping Act to produce the Probabilistic Seismic Hazard Maps for the State.

(c) California Building Code

The California Building Code (CBC), which is codified in Title 24 of the California Code of Regulations, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, means of egress to facilities (entering and exiting), and general stability of buildings. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all buildings and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable. The provisions of the CBC apply to the construction, alteration, movement, replacement, location, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The 2019 edition of the CBC is based on the 2018 International Building Code (IBC) published by the International Code Council, which replaced the Uniform Building Code (UBC). The code is updated triennially, and the 2019 edition of the CBC was published by the California Building Standards Commission on July 1, 2019, and took effect starting January 1, 2020. The 2019 CBC contains California amendments based on the American Society of Civil Engineers (ASCE) Minimum Design Standard ASCE/SEI 7-16, Minimum Design Loads for Buildings and Other Structures, provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (such as wind loads) for inclusion into building codes. Seismic design provisions of the building code generally prescribe minimum lateral forces applied statically to the

[12] CGS, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, Special Publication 117A, 2008.
[13] CGS, *Recommended Criteria for Delineating Seismic Hazard Zones in California*, Special Publication 118, 2004.
[14] CGS, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, Special Publication 117A.

structure, combined with the gravity forces of the dead and live loads of the structure, which the structure then must be designed to withstand. The prescribed lateral forces are generally smaller than the actual peak forces that would be associated with a major earthquake. Consequently, structures should be able to (1) resist minor earthquakes without damage; (2) resist moderate earthquakes without structural damage but with some nonstructural damage; and (3) resist major earthquakes without collapse, but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a seismic design category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site; SDC ranges from A (very small seismic vulnerability) to E/F (very high seismic vulnerability and near a major fault). Seismic design specifications are determined according to the SDC in accordance with CBC Chapter 16. CBC Chapter 18 covers the requirements of geotechnical investigations (Section 1803), excavation, grading, and fills (Section 1804), load-bearing of soils (Section 1806), as well as foundations (Section 1808), shallow foundations (Section 1809), and deep foundations (Section 1810). For Seismic Design Categories D, E, and F, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading, plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also addresses measures to be considered in structural design, which may include ground stabilization, selecting appropriate foundation type and depths, selecting appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions.

Requirements for geotechnical investigations are included in Appendix J, CBC Section J104, Engineered Grading Requirements. As outlined in Section J104, applications for a grading permit are required to be accompanied by plans, specifications, and supporting data consisting of a soils engineering report and engineering geology report. Additional requirements for subdivisions requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953 to 17955 and in 2013 CBC Section 1802. Testing of samples from subsurface investigations is required, such as from borings or test pits. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness.

(d) California Division of Oil, Gas, and Geothermal Resources (CalGEM)

The California Division of Oil, Gas, and Geothermal Resources (CalGEM) regulates production of oil and gas, as well as geothermal resources, within the State of California. CalGEM requirements in preparation of environmental documents under CEQA are defined in CCR, Title 14, Division 2, Chapter 2. Staff also assists operators in avoiding or reducing environmental impacts from the development of oil, gas, and geothermal resources in California, including subsidence. PRC Sections 3315, et seq. CalGEM regulations, which are defined in CCR, Title 14, Division 2, Chapter 4, include well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines to ensure effectiveness in preventing migration of oil and gas from a producing zone to shallower zones, including potable groundwater zones, as well as subsidence.

(e) California Penal Code Section 622.5

California Penal Code Section 622.5 provides the following: “Every person, not the owner thereof, who willfully injures, disfigures, defaces, or destroys any object or thing of archeological or historical interest or value, whether situated on private lands or within any public park or place, is guilty of a misdemeanor.”

(f) CEQA Guidelines, Paleontological Resources

The CEQA Guidelines (Title 14, Chapter 3 of the California Code of Regulations, Section 15000 et seq.) define the procedures, types of activities, individuals, and public agencies required to comply with CEQA.

State requirements for paleontological resource management are included in PRC Section 5097.5 and Section 30244. These statutes prohibit the removal of any paleontological site or feature from public lands (as used in this section, lands owned by or under the jurisdiction of, the state, any city, county, district, authority, or public corporation, or any agency thereof) without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, or district) lands.

(3) Local

(a) Los Angeles General Plan Safety Element

The City’s General Plan Safety Element, which was adopted in 1996, addresses public safety risks due to natural disasters, including seismic events and geologic conditions, and sets forth guidance for emergency response during such disasters. The Safety Element also provides maps of designated areas within Los Angeles that are considered susceptible to earthquake-induced hazards, such as fault rupture and liquefaction.

As required by PRC Section 2699, discussed above, the Safety Element states that seismic hazard maps prepared by the State Geologist, which are applicable to the City, are incorporated into Exhibit A of the Safety Element. Exhibit A of the Safety Element shows a Fault Rupture Study Area in the Project vicinity. In addition, the Los Angeles Department of Building and Safety (LADBS) utilizes more current and detailed mapping than the generalized maps in the Safety Element, and provides information regarding designations for individual site parcels within the City's Zone Information and Map Access System (ZIMAS). The CGS released a Map of Earthquake Zones of Required Investigation for the Los Angeles Quadrangle in June 2017. The Safety Element also states that local jurisdictions are required by the Seismic Hazards Mapping Act to require additional studies and appropriate mitigation measures for development projects in the areas identified as potential hazard areas by the State seismic hazard maps. In addition, the Safety Element states that as maps are released for Los Angeles, they will be utilized by LADBS to help identify areas where additional soils and geology studies are needed for evaluation of hazards and imposition of mitigation measures prior to issuance of building permits.

The last section of the Safety Element contains goals, objectives, policies that are broadly stated to reflect the comprehensive scope of the Emergency Operations Organization (EOO), the City agency (program) which implements the Safety Element. As such it includes objectives with supporting policies to implement comprehensive hazard mitigation plans and programs, emergency response plans and disaster recovery plans that are coordinated with one another. It includes no objectives or policies that pertain to the review of new development projects to avoid or mitigate geologic and seismic hazards.

(b) City of Los Angeles General Plan Conservation Element

The Conservation Element of the City of Los Angeles General Plan recognizes paleontological resources in Section 3, Archaeological and Paleontological [Resources], wherein it identifies the protection of paleontological resources as an objective. The Conservation Element identifies site protection as important, stating, "Pursuant to CEQA, if a land development project is within a potentially significant paleontological area, the developer is required to contact a bona fide paleontologist to arrange for assessment of the potential impact and mitigation of potential disruption of or damage to the site. If significant paleontological resources are uncovered during project execution, authorities are to be notified and the designated paleontologist may order excavations stopped, within reasonable time limits, to enable assessment, removal or protection of the resources."[15]

(c) Los Angeles Municipal Code

Chapter IX of the Los Angeles Municipal Code (LAMC) contains the City's Building Code, which incorporates by reference the CBC, with City amendments for additional requirements. The LADBS is responsible for implementing the Building Code provisions of the LAMC. To that end, LADBS issues building and grading permits for construction

[15] City of Los Angeles, Conservation Element of the City of Los Angeles General Plan, City Plan Case No. 2001-0413-GPA, Council File No. 01-1094, 2001, page II-5.

projects. Building permits are required for any building or structure that is erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted, or demolished. The function of the City's Building Code is to protect life safety and compliance with the LAMC. The sections of LAMC Chapter IX address numerous topics, including earthwork and grading activities, import and export of soils, erosion and drainage control, and general construction requirements that address flood and mudflow protection, slides and unstable soils. Additionally, LAMC Section 91.7006 includes specific requirements addressing seismic design, grading, foundation design, geologic investigations and reports, soil and rock testing, and groundwater. Specifically, LAMC Section 91.1803 adopts the requirements of CBC Section 1803, which requires that a Final Geotechnical Report with final design recommendations prepared by a California-registered geotechnical engineer be submitted to the LADBS for review prior to issuance of a grading permit. Final foundation design recommendations must be developed during final project design, and other deep foundation systems that may be suitable would be addressed in the Final Geotechnical Report.

b) Existing Conditions

(1) Regional Geologic Setting

The Los Angeles Basin is bounded to the northeast, east and southeast by the Santa Ana Mountains and the San Joaquin Hills, to the north and northwest by the Santa Monica Mountains, and to the west, southwest, and south by the Pacific Ocean. The Los Angeles Basin was formed over 22 million years ago as the result of tectonic forces between the North American and Pacific plates and has been the site of nearly continuous deposition of first marine and more recently continental sedimentary rock.

Regionally, four major faults subdivide the Basin into four structural blocks: Central, Northwest, Southwest, and Northeast structural blocks. The Project Site is located in the northern portion of the Central Block of the Los Angeles Basin, which is situated at the northwestern tip of the Peninsular Ranges Geomorphic Province.[16] The Peninsular Ranges are characterized by sub-parallel blocks sliced longitudinally by young, steeply dipping northwest-trending fault zones. The dominant geologic structural features are the northwest-trending fault zones that either taper off to the northwest or terminate at east-trending reverse faults that form the southern margin of the Transverse Ranges.

During the last 2 million years, defined as the Pleistocene and Holocene epochs, the Los Angeles Basin and surrounding mountain ranges have been uplifted to form the present landscape. Erosion of the surrounding mountains has resulted in deposition of unconsolidated sediments in low-lying areas by waterways, such as the Los Angeles River. Areas that have experienced subtle uplift have been eroded with gullies.

[16] A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces.

The Los Angeles River is located east of the Project Site beyond the adjacent railroad right-of-way. The Project Site is located approximately two miles south/southwest of the Elysian Hills, the westernmost extension of the Santa Monica Mountains. Project Site soils, therefore, include generally young (i.e., modern-era) alluvial fan deposits originating from the hills over sandy river alluvium deposits.

(2) Site Geology

(a) Generalized Subsurface Conditions

Geologic mapping indicates that the surficial geology of the Project Site consists of young alluvium composed of unconsolidated sand, silt, and gravel.[17] The Preliminary Geotechnical Report indicates artificial fill consisting of silty sand mixed with construction debris is present to depths of five to six feet across the Project Site. Alluvial sediments consisting primarily of moist sand and gravel with some silt are present to the maximum explored depth of 75.8 feet below ground surface (bgs). The upper five to 20 feet of the alluvial sediments were loose, below which the density increased, with the deepest sediments consisting of very dense gravelly sand.

(b) Groundwater

As stated in the Preliminary Geotechnical Report, groundwater is assumed to be present between 57 and 61 feet bgs on the Project Site.[18] Despite the Project Site's proximity to the Los Angeles River, most portions of the river are completely channelized for flood protection, including the portion adjacent to the Project Site, as are many of its tributaries, including Compton Creek, Rio Hondo, Arroyo Seco, and Tujunga Wash. A complex network of underground storm drains and open-air flood control channels feeds the tributaries.[19]

(3) Expansive Soils

Expansive soils are soils that swell when subjected to moisture and shrink when dried. Expansive soils are typically associated with clayey soils. When not addressed, soil expansion can have adverse effects on structures. According to the Preliminary Geotechnical Report, the soils encountered near the ground surface and at the anticipated excavation depths exhibit low expansion potential.[20]

[17] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 7.
[18] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 8.
[19] LA Sanitation, Watershed Protection, http://www.lastormwater.org/about-us/about-watersheds/los-angeles-river/. Accessed February 2, 2021.
[20] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 13.

(4) Geologic Hazards

(a) Faulting and Seismicity

A fault is a fracture in the crust of the earth along which rocks or sediment on one side has moved relative to those on the other side.[21] Faults are the result of excessive strain cause by compression or extension within the earth's crust over long periods of time. A fault trace is the line on the earth's surface representing the fault location. Surface rupture occurs when movement along a fault causes ground displacement at the surface. Fault rupture may occur suddenly during an earthquake or slowly in the form of a fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. Fault creep is the slow displacement (movement) of the earth's crust.

Terms, such as "potentially active" and "inactive," have been commonly used in the past to describe faults that do not meet the State Mining and Geology Board (SMGB) definition of "active fault." However, these terms have the potential to cause confusion from a regulatory perspective as they are not defined in the Alquist-Priolo Earthquake Fault Zoning Act and may have other non-regulatory meanings in the scientific literature or in other regulatory environments. In order to avoid these issues, below are terms that provide added precision when used in classifying faults regulated by the Alquist-Priolo Earthquake Fault Zoning Act. Faults are classified into three categories on the basis of the absolute age of their most recent movement:

1. Holocene-active faults: Faults that have moved during the past 11,700 years. This age boundary is an absolute age (number of years before present). This class of fault is regulated under the Alquist-Priolo Earthquake Fault Zoning Act.
2. Pre-Holocene faults: Faults that have not moved in the past 11,700 years and, thus, do not meet the criteria of "Holocene-active fault" as defined in the Alquist-Priolo Earthquake Fault Zoning Act and SMGB regulations. This class of fault is not regulated under the Alquist-Priolo Earthquake Fault Zoning Act.
3. Age-undetermined faults: Faults where the recency of fault movement has not been determined. Faults can be "age-undetermined" if the fault in question has simply not been studied in order to determine its recency of movement. Faults can also be age-undetermined due to limitations in the ability to constrain the timing of the recency of faulting. Examples of such faults are instances where datable materials are not present in the geologic record, or where evidence of recency of movement does not exist due to stripping (either by natural or anthropogenic processes) of Holocene-age deposits. Within the framework of the Alquist-Priolo Earthquake Fault Zoning Act, age-undetermined faults within regulatory Earthquake Fault Zones are considered "Holocene-active" until proven otherwise.

Earthquake Fault Zones are regulatory zones (also known as Alquist-Priolo Earthquake Fault Zones) that encompass traces of Holocene-active faults to address hazards

[21] CGS, Earthquake Fault Zones, *A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*, Special Publication 42.

associated with surface fault rupture. Earthquake Fault Zones are delineated by the State Geologist and implemented by lead agencies through permitting, inspection and land-use planning activities (PRC Chapter 7.5, Section 2621). 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.[22]

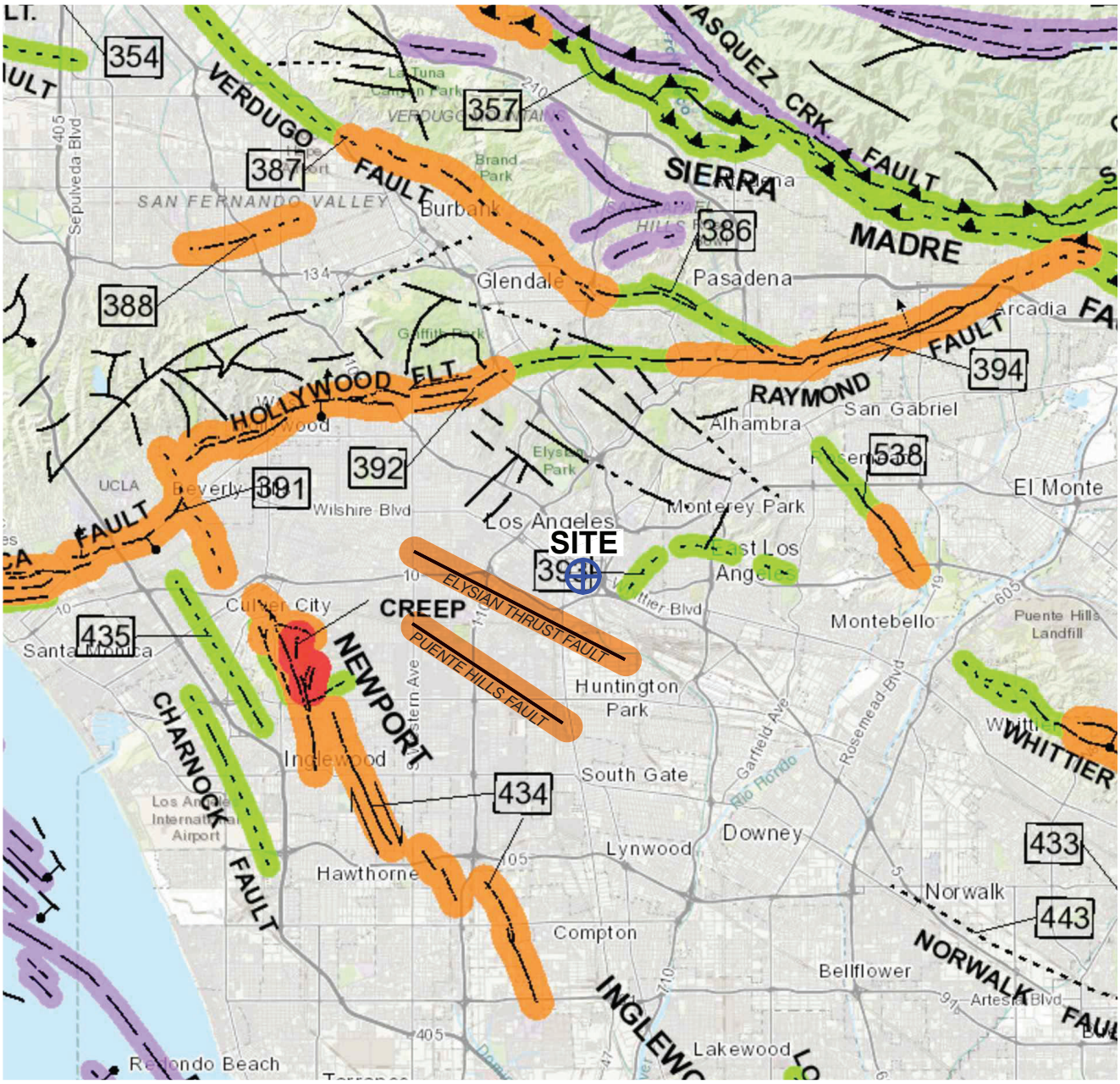
The CGS released a Map of Earthquake Zones of Required Investigation for the Los Angeles Quadrangle in June 2017. Faults within the region are shown on **Figure IV.D-1**, *Regional Fault Map*, which includes historic faults (faults with movement recorded during historic times, generally the last 200 years), Holocene faults (i.e., movement within the last 11,700 years), Quaternary faults (i.e., movement between 11,700 [Holocene time] and 2.6 million years ago), and pre-quaternary faults (i.e., movement older than 2.6 million years before present).

The Elysian Park Thrust Fault, Puente Hills Fault, and the Hollywood Fault are located approximately two miles, four miles, and six miles, respectively, from the Project Site. These faults are considered to have the greatest potential to create earthquake-related effects at the Project Site. No active faults are mapped as traversing the Project Site. The closest fault with movement during historic times is the Newport-Inglewood fault (approximately eight miles), and the closest active fault is the Elysian Park Thrust Fault (approximately two miles).[23] The Preliminary Geotechnical Report identified the Project Site as not being within a designated Alquist-Priolo Earthquake Fault Zone and, therefore, at low risk of fault rupture occurring at the Project Site.[24]

(b) Ground Shaking

As noted above, the Project Site is not located within an Alquist-Priolo Earthquake Fault Zone or City Fault Rupture Study Area. However, the Project Site is located within seismically active Southern California and is, therefore, subject to seismic ground shaking. The effects of seismic shaking depend on the distance between the Project Site and causative fault and the on-site geology. Active faults and fault systems that might generate seismic shaking at the Project Site, which are discussed more fully in the Preliminary Geotechnical Report, include the San Andreas Fault System, Whittier-Elsinore Fault, San Jacinto Fault, and the faults discussed above.

[22] CGS, Special Publication 42, Interim Revision 2007.
[23] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, Table D-1, Principal Fault Location.
[24] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 8.



REFERENCE: JENNINGS AND BRYANT (2010)

SOURCE: Twining Consulting, 2018

670 Mesquit

Figure IV.D-1
Regional Fault Map

(c) Site Stability - Liquefaction, Lateral Spreading, and Settlement

Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil caused by the build-up of pore water pressure during cyclic loading, such as that produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in vertical settlement and can also cause lateral ground deformations (lateral spreading). Typically, liquefaction occurs in areas where there are loose to medium dense non-cohesive soils and the depth to groundwater is less than 50 feet from the surface. Seismic shaking can also cause soil compaction and ground settlement without liquefaction occurring, including settlement of dry sands above the water table. According to Exhibit B of the Safety Element, the Project Site is not within an area susceptible to liquefaction.

In addition, a review of the State of California Official Map of Seismic Hazard Zones for the Los Angeles Quadrangle, as summarized in the Preliminary Geotechnical Report, indicates the Project Site is not located within a zone of required investigation for liquefaction. Based on the lack of shallow groundwater, relatively dense soils at the Project Site, and relatively uniform soil stratum across the Project Site, the Preliminary Geotechnical Report concludes that the liquefaction potential, and potential for lateral spreading, and settlement at the Project Site is very low.[25]

(d) Landslides

Landslides are movements of surface material down a slope.[26] The Project Site topography and vicinity are flat, with ground surface elevations ranging from approximately 246 to 250 feet across the Project Site. According to the Preliminary Geotechnical Report, the potential for landsliding and seismically-induced slope instability at the Project Site is considered negligible.[27] In addition, the Project Site is not located within a designated landslide area, as shown in the Los Angeles General Plan Safety Element, Exhibit C, Landslide Inventory and Hillside Areas in the City.

(e) Subsidence

Subsidence is characterized as a sinking of the ground surface relative to surrounding areas and can generally occur where deep soil deposits are present. Subsidence in areas of deep soil deposits is typically associated with regional groundwater withdrawal or other fluid withdrawal from the ground, such as oil and natural gas. Subsidence can result in the development of ground cracks and damage to subsurface vaults, pipelines, and other improvements.

The Project Site is not located within a known oil field or natural gas storage field. While the Union Station Oil Field, located approximately 0.5 miles northwest of the Project Site,

[25] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.
[26] United States Geologic Survey (USGS), Earthquake Hazards Program, Earthquake Glossary, https://earthquake.usgs.gov/learn/glossary/?term=landslide. Accessed February 2, 2021.
[27] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.

has produced petroleum from scattered wells located in proximity to the Project Site, records of the CalGEM do not indicate the presence of producing or abandoned petroleum wells on the Project Site.[28] As the Project Site is not located within a known oil field or natural gas storage field, subsidence associated with extraction activities is not anticipated. No regional groundwater extraction occurs on the Project Site, and, as such, subsidence associated with this activity is not anticipated.

(f) Erosion

Soil erosion refers to the process by which soil or earth material is loosened or dissolved and removed from its original location. Erosion can occur by varying processes and may occur in an area where bare soil is exposed to wind or moving water (both rainfall and surface runoff). The processes of erosion are generally a function of material type, terrain steepness, rainfall or irrigation levels, surface drainage conditions, and general land uses. Topsoil is used to cover bare surface areas for the establishment and maintenance of vegetation due to its high concentrations of organic matter and microorganisms.

The Project Site is located in a highly urbanized area of Los Angeles and is currently developed. Negligible, if any, native topsoil occurs on the Project Site as it is currently developed with structures and surface parking.

(g) Other Geologic Conditions

According to the City of Los Angeles Methane and Buffer Zone Map, the Project Site is located within a City Methane Buffer Zone. Methane is addressed in Section IV.F, *Hazards and Hazardous Materials*, of this Draft EIR. However, according to the CalGEM, no oil wells are located on the Project Site or adjacent properties.[29]

Lastly, no distinct or prominent geologic or topographic features, such as hilltops, ridges, hillslopes, canyons, ravines, rock outcrops, water bodies, streambeds, or wetlands, are located at the Project Site.

(h) Paleontological Resources

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.[30] While sediments dating back to the Cretaceous (66 million years ago) are preserved in the Los Angeles Basin, continuous sedimentation began in the middle Miocene (around 13 million years ago).[31] Since that time, sediments have eroded into the basin from the surrounding highlands, resulting in thousands of feet of accumulation.[32]

[28] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 7.
[29] Rincon Consultants, Phase I Environmental Site Assessment, 670 Mesquit Street, Los Angeles, California, September 6, 2016. Provided in Appendix G-1 of this Draft EIR.
[30] ESA, Paleontological Resources Assessment Report, August 2020.
[31] ESA, Paleontological Resources Assessment Report, August 2020.
[32] ESA, Paleontological Resources Assessment Report, August 2020.

Geologic mapping[33] indicates that Quaternary Alluvium deposited during Holocene time covers the surface of the Project Site. Geotechnical analysis did not determine the depth at which younger alluvium transitions to older alluvium within the Project Site. However, to the northwest and north of the Project Site, along US-110 (Harbor Freeway) and US-101, a study correlating well and boring logs found that the depths of the older alluvium are highly variable, ranging from 10 and 200 feet bgs.[34]The Holocene-aged Quaternary Alluvium is relatively recent in age in the upper layers and, therefore, is not old enough to contain fossil remains, which the Society of Vertebrate Paleontology (SVP) defines as over 5,000 years old. However, these sediments increase in age with depth, such that while the surficial sediments are too young to preserve fossils, the underlying older Quaternary Alluvium dates to the late Holocene or Pleistocene and, therefore, may preserve fossil resources. These sediments have a rich fossil history in Los Angeles and throughout southern California.[35]

A paleontological database search was conducted of the collection housed at the Natural History Museum of Los Angeles County (NHMLAC)[36] for records of fossil localities on and around the Project Site. The records search returned no known localities on the Project Site; however, similar sedimentary deposits in Downtown Los Angeles have yielded a number of vertebrate fossils.[37]

The closest fossil locality on record is approximately 2 miles west of the Project Site at the intersection of Hill Street and 12th Street, where a fossil horse (*Equus*) was recovered from 43 feet below ground surface (bgs). Approximately 2 miles northeast of the Project Site near the intersection of Mission Road and Daly Street, around the Golden State Freeway (I-5), fossil specimens of pond turtle, (*Clemmys mamorata*), ground sloth (*Paramylodon harlani*), mastodon (*Mammut americanum*), mammoth (*Mammuthus imperator*), horse (*Equus*), and camel (*Camelops*) were recovered from a depth of 20 to 35 feet bgs. Just north of that locality, 2.13 miles northeast of the Project Site, near the intersection of Workman Street and Alhambra Avenue, excavations for a storm drain recovered fossil specimens of turkey (*Meleagris californicus*), saber-toothed cat (*Smilodon fatalis*), horse (*Equus*), and deer (*Odocoileus*) at an unstated depth.[38]

33 ESA, Paleontological Resources Assessment Report, August 2020.
34 ESA, Paleontological Resources Assessment Report, August 2020.
35 ESA, Paleontological Resources Assessment Report, August 2020.
36 The Natural History Museum of Los Angeles County (NHMLAC) is the official repository for paleontological resources in Los Angeles County and the research standard for universities, colleges, and professionals in the Southern California region.
37 McLeod, S., Re: V Paleontological resources for the proposed 670 Mesquit Street Mixed Use Project, Project # 170431.00, in the City of Los Angeles, Los Angeles County, Project Area. Letter response to Vanessa Ortiz, March 9, 2018.
38 McLeod, S., Re: V Paleontological resources for the proposed 670 Mesquit Street Mixed Use Project.

3. Project Impacts

a) Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, a project would have a significant impact related to geology and soils if it would:

Threshold (a): 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[39] Special Publication 42;***
- ***ii. Strong seismic ground shaking;***
- ***iii. Seismic-related ground failure, including liquefaction;***
- ***iv. Landslides;***

Threshold (b): Result in substantial soil erosion or the loss of topsoil;

Threshold (c): 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;

Threshold (d): Be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;[40]

Threshold (e): 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 wastewater; or

Threshold (f): Directly or indirectly destroy a unique paleontological resource or site of unique geologic feature.

For this analysis, the Appendix G Thresholds are relied upon. The analysis utilizes factors and considerations identified in the City's 2006 L.A. CEQA Thresholds Guide, as

[39] Now the CGS.

[40] The CBC, based on the International Building Code and the now defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, Section 1803.5.3 of the CBC describes the criteria for analyzing expansive soils.

appropriate, to assist in answering the Appendix G Threshold questions. The factors to evaluate geology and soils impacts include:

(1) Geologic Hazards

- Cause or accelerate geologic hazards, which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

(2) Sedimentation and Erosion

- Constitute a geologic hazard to other properties by causing or accelerating instability from erosion; or
- Accelerate natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site.

(3) Landform Alteration

- Cause one or more distinct and prominent geologic or topographic features to be destroyed, permanently covered, or materially and adversely modified as a result of the project. Such features may include, but are not limited to, hilltops, ridges, hillslopes, canyons, ravines, rock outcrops, water bodies, streambeds, and wetlands.

(4) Paleontological Resources

- Whether, or the degree to which, the project may result in the permanent loss of, or loss of access to, a paleontological resource.
- Whether the paleontological resource is of regional or statewide significance.

b) Methodology

(1) Geology and Soils

The analysis of impacts associated with geology and soils is based on the Preliminary Geotechnical Report prepared for the Project by Twining Consulting and provided in Appendix F-1 of this Draft EIR. The Preliminary Geotechnical Report was based on review of relevant maps and reports, Project Site testing and reconnaissance, subsurface investigations, laboratory testing, and geotechnical analysis and evaluation. The Preliminary Geotechnical Report was prepared according to requirements established by LADBS. Those requirements are based on guidelines and specifications established in such sources as the City Building Code, the CGS, American Society for Testing and Materials (ASTM) and LADBS Information Bulletins, which document LADBS requirements and guidelines for specific topics in greater detail than the City's Building Code.

Per established procedures, the Preliminary Geotechnical Report evaluated the underlying geologic and soil conditions to determine their potential for causing hazardous

conditions and identifies foundation requirements needed to ensure that new building construction is safe. Three subsurface investigations were performed on the Project Site, including the excavation, sampling, logging, testing, and engineering analysis of exploratory borings and Cone Penetration Test soundings.[41] Preliminary recommendations regarding the design and construction of the Project are based on the results of this geotechnical investigation.

According to LAMC Section 91.1803, a Final Geotechnical Report must also be prepared based on the final construction and building plans prepared by the Applicant and reviewed by the City prior to the issuance of building permits to construct the Project. Based on the ground conditions and building design, the Final Geotechnical Report will include specific recommendations for site preparation, excavation, foundation design and shoring/retaining wall specifications that are consistent with the recommendations of the Preliminary Geotechnical Report.

The Project would be regulated by the various laws, regulations, and policies summarized in Subsection 2.a, *Regulatory Framework*, above. Compliance by the Project with applicable federal, State, and local laws and regulations is assumed in this analysis, and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now.

(2) Paleontological Resources

The analysis of paleontological resources in this section of the Draft EIR is summarized from the Paleontological Resources Assessment Report prepared by qualified ESA paleontologists.[42] The analysis is based on a review of the NHMLAC paleontological records search results and other documentation regarding disturbances to the Project Site and its subsurface geological conditions (e.g., the Preliminary Geotechnical Report provided in Appendix F-1 of this Draft EIR). The objective of the record search through the NHMLAC 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 SVP guidelines for assessing the importance of paleontological resources in areas of potential environmental effect.

The potential to encounter previously unknown buried paleontological resources during construction at the Project Site 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.

Paleontological sensitivity is the potential for a geologic unit to produce scientifically significant fossils that could yield information important to prehistory, or that embody the

[41] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 2.
[42] ESA, Paleontological Resources Assessment Report, August 2020, pages 8-10.

distinctive characteristics of a type of organism, environment, period of time, or geographic region. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit; for this reason, paleontological sensitivity depends on the known fossil data collected from the entire geologic unit, not just a specific survey. The SVP[43] defines four categories of paleontological sensitivity or, per the SVP guidelines, potential, for the presence of paleontological resources – high, low, undetermined, and no potential, as further described in the Paleontological Resources Assessment Report.[44] For geologic units with high potential, full-time monitoring is typically appropriate during any project-related ground disturbance because of the risk to paleontological resources. For geologic units with low potential, protection or salvage efforts are not generally required because of the low risk of encountering paleontological resources. For geologic units with undetermined potential, accepted professional practice typically includes field surveys conducted by a qualified vertebrate paleontologist to determine the paleontological potential of the rock units present in the study area, which in turn prescribes how mitigation measures should be assigned. For geologic units with no potential to produce scientifically significant fossils, no protection or salvage efforts are normally required.

c) Project Design Features

No specific Project Design Features are proposed with regard to geology, soils, seismicity, or paleontological resources.

d) Analysis of Project Impacts

Threshold (a): Would the Project 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.

(1) Impact Analysis

The Project is a mixed-use residential project with several subterranean parking levels that would not require deep boring into the Earth's crust, fracking or other heavy industrial or mining use that could exacerbate existing environmental conditions that could cause in whole or in part impacts related to rupture of a known earthquake fault. Furthermore, as discussed above, the Project Site is not located within a designated Alquist-Priolo Earthquake Fault Zone, and no active faults are mapped projecting through the Project Site. The closest active faults to the Project Site are the Elysian Park Fault System and

43 ESA, Paleontological Resources Assessment Report, August 2020, pages 10-11.
44 ESA, Paleontological Resources Assessment Report, August 2020, pages 10-11.

the Puente Hills Fault System, located approximately two and four miles from the Project Site.[45] Because the Project Site lies more than 500 feet outside of the Fault Rupture Study Area, the possibility of impacts due to ground rupture from earthquake fault rupture is considered low. **Therefore, development of the Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault. As such, impacts would be less than significant.**

(a) Project with the Deck Concept

As stated in Chapter II, *Project Description*, the Applicant seeks to construct a 132,000-square foot Deck that would extend over a portion of the off-site Railway Properties east of the Project Site. Construction activities for the Project with the Deck Concept would be similar to the Project. The Deck would be supported by vertical columns that would be located between the existing railroad tracks. The Deck would use pre-fabricated steel or pre-cast concrete members to speed construction and minimize effects on railroad operations. Excavation depths for the Project with the Deck Concept would be the same as the Project. The foundations for the vertical columns would be drilled concrete piers, with one drilled pier below each vertical column. The piers would vary between approximately 30 to 50 feet in length. Deck construction and installation of the piers would be carried out in close coordination with the railyard authorities.

As the potential for earthquake rupture would be the same based on distance of the Project Site from the Fault Rupture Study Area, impacts associated with earthquake fault rupture would be essentially the same under the Project or the Project with the Deck Concept. As with the Project, the Deck would also be located more than 500 feet outside of the Fault Rupture Study Area, and therefore the possibility of impacts due to ground rupture from the earthquake fault rupture on the Project with the Deck Concept would be considered low. In addition, the depth of excavation for the Project with the Deck Concept, as discussed above, would be similar to the Project, and therefore would also not indirectly or directly cause or exacerbate any existing environmental conditions related to fault rupture. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, development of the Project with the Deck Concept would not directly or indirectly impacts cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault. As such, impacts would be less than significant.**

(2) Mitigation Measures

Impacts regarding fault rupture were determined to be less than significant without mitigation. Therefore, no mitigation measures are required.

[45] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, Table D-1, Principal Fault Location.

(3) Level of Significance after Mitigation

Impacts regarding fault rupture were determined to be less than significant without mitigation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

Threshold (a): Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

ii. Strong seismic ground shaking?

(1) Impact Analysis

The Project Site is located within a seismically active region, and, thus, the potential for seismic ground shaking exists at the Project Site. The level of ground shaking that would be experienced at the Project Site from regional faults, including, but not limited to, the Hollywood, Upper Elysian Park, Puente Hills, Newport-Inglewood, Verdugo, and Sierra Madre faults, would be a function of several factors, including earthquake magnitude, type of faulting, rupture propagation path, distance from the epicenter, earthquake depth, duration of shaking, site topography, and site geology. The Preliminary Geotechnical Report concluded, based on established standards, that an earthquake magnitude of 6.91 should be considered for the seismic design of building on the Project Site.[46]

The Project would not exacerbate existing environmental conditions related to seismic ground shaking at the Project Site because the Project would not involve mining operations, excavation of large areas, or the extraction or injection of oil or groundwater, that could create unstable seismic conditions that would exacerbate ground shaking.

Additionally, as required for any new project development in Los Angeles, the Project's building design and construction must conform to the current seismic design provisions of the Los Angeles Building Code, which incorporates relevant provisions of the 2019 CBC. The Los Angeles 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. Design and construction of the Project would be required to adhere to the seismic safety requirements contained in the Los Angeles Building Code, as well as the applicable recommendations provided in the geotechnical investigations required by the City to minimize seismic-related hazards.

The Preliminary Geotechnical Report concluded, based on subsurface investigations and geotechnical analysis of the collected data, that Project development on the Project Site is feasible from a geotechnical standpoint, provided that applicable regulations are met, and construction and design are performed in accordance with its recommendations. A final design-level geotechnical report (or Final Geotechnical Report) would also be

[46] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 10.

required to develop geotechnical recommendations for final design. Per the Los Angeles Building Code requirements, prior to issuance of a grading permit, a qualified geotechnical engineer must prepare and submit to the Los Angeles Department of Building and Safety a Final Geotechnical Report that includes site-specific design recommendations for seismic safety and design requirements for foundations, retaining walls/shoring and excavation to meet applicable State and City regulatory requirements.

Thus, compliance with applicable regulatory requirements (i.e., the City of Los Angeles Building Code and the CBC) and incorporation of these recommendations would reduce the potential for significant damage to structures resulting from strong seismic ground shaking and the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury or death, to the maximum extent practical. Therefore, based on the above, development of the Project would not directly or indirectly cause substantial adverse effects, including risk of loss, injury, or death involving strong seismic ground shaking hazards. **Therefore, development of the Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. As such, Project impacts would be less than significant.**

(a) Project with the Deck Concept

As the potential for seismic ground shaking and associated regulatory requirements would be the same, impacts associated with seismic ground shaking would be essentially the same under the Project or the Project with the Deck Concept. In addition, the depth of excavation under the Project with the Deck Concept, as discussed above, would be similar to the Project's, and therefore would also not indirectly or directly cause or exacerbate any existing environmental conditions related to seismic ground shaking (i.e., would not involve mining operations, excavation of large areas, or the extraction or injection of oil or groundwater, that could create unstable seismic conditions that would exacerbate ground shaking). Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **Therefore, development of the Project with the Deck Concept would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. As such, impacts would be less than significant.**

(2) Mitigation Measures

Impacts regarding strong seismic ground shaking were determined to be less than significant without mitigation. Therefore, no mitigation measures are required.

(3) Level of Significance after Mitigation

Impacts regarding strong seismic ground shaking were determined to be less than significant without mitigation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

Threshold (a): Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

iii. Seismic-related ground failure, including liquefaction?

(1) Impact Analysis

As previously stated under Section 2.b, *Existing Conditions*, Exhibit B of the Safety Element states that the Project Site is not within an area susceptible to liquefaction. The State of California Official Map of Seismic Hazard Zones for the Los Angeles Quadrangle also indicates that the Project Site is not located within a zone of required investigation at the Project Site.[47] The soils at a depth of 5 feet or more bgs consist of layers of relatively dense sands with gravel and some silt, which were assessed as having very low potential for liquefaction in the Preliminary Geotechnical Report.[48] In addition, the Project would not add materials that could create a liquefiable condition. **Therefore, the 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. As such, Project impacts would be less than significant.**

(a) Project with the Deck Concept

As the potential for seismic-related ground failure, including liquefaction, would be the same as the Project Site, and located outside of a zone of required investigation for liquefaction, impacts associated with seismic-related ground failure, including liquefaction, would be essentially the same as the Project under the Project with the Deck Concept. In addition, the Project with the Deck Concept would not add materials that could create a liquefiable condition. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **Therefore, the Project with the Deck Concept 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. As such, impacts would be less than significant.**

(2) Mitigation Measures

Impacts regarding seismic-related ground failure were determined to be less than significant without mitigation. Therefore, no mitigation measures are required.

(3) Level of Significance after Mitigation

Impacts regarding seismic-related ground failure were determined to be less than significant without mitigation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

[47] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.
[48] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.

Threshold (a): Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

iv. Landslides

As discussed in Subsection VI.6, *Impacts Found Not to Be Significant*, and in the Initial Study (Appendix A-2 to this Draft EIR), the Project Site is not located within a designated landslide area. The Project Site is located in an urbanized area on relatively flat land and is not located in proximity to any mountains or steep slopes. As such, there is no potential for landslides to occur on or near the Project Site. Further, the Project would not create new significant slopes on the Project Site that would be subject to landslide hazards. **Therefore, no impact would occur with respect to the Project directly or indirectly causing potential substantial adverse effects from landslides, and no further analysis is required.**

(a) Project with the Deck Concept

As the Project with the Deck Concept would, like the Project, be located outside of a designated landslide area, conditions related to landslide hazards are would be essentially the same under the Project with the Deck Concept. Further, the Project with the Deck Concept also would not create new significant slopes on the Project Site that would be subject to landslide hazards. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, impacts associated with landslides under the Project with the Deck Concept would be less than significant.**

Threshold (b): Would the Project result in substantial soil erosion or the loss of topsoil?

(1) Impact Analysis

(a) Construction Impacts

Project construction would result in ground surface disruption during excavation, grading, and trenching that would create the potential for erosion to occur. However, wind erosion would be minimized through implementation of the soil stabilization measures required by SCAQMD Rule 403 (Fugitive Dust), such as daily watering (see Section IV.B, *Air Quality*, of this Draft EIR for further discussion). The potential for water erosion would be reduced by the implementation of standard erosion control measures during site preparation and grading activities, as discussed in more detail under Section IV.G, *Hydrology and Water Quality*, of this Draft EIR, since the Project would be subject to existing regulations associated with the protection of water quality. Construction activities would be conducted in accordance with applicable City standard erosion control practices required pursuant to the CBC and the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit issued by the Los Angeles Regional Water Quality Control Board (LARWQCB), as applicable. In accordance with these requirements, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared

that incorporates Best Management Practices (BMPs) to control water erosion during the Project's construction period. **Thus, through compliance with applicable code and regulatory requirements, impacts associated with substantial erosion or loss of topsoil as a result of Project construction would be less than significant.**

(b) Operational Impacts

Once constructed, all surfaces would be covered by pavement, landscaping, or buildings, which would not leave any exposed areas of bare soil susceptible to erosion. Required drainage control features would be effective in minimizing any potential for substantial erosion at the Project Site. For further discussion, refer to Section IV.G, *Hydrology and Water Quality*, regarding the proposed on-site, post construction drainage system and requirements that would manage stormwater runoff to protect water quality and quantity. As indicated therein, the Project would comply with Low Impact Development (LID)-required Best Management Practices (BMPs) to manage stormwater runoff including installation of stormwater management systems. Proposed systems that would capture and potentially reuse surface runoff include either a drywell system (MWP) or a capture and reuse system potentially combined with a bio-filtration system. Both systems would reduce the volume of water required for capture and reuse under the LID; and would comply with the procedures set forth in the City of Los Angeles' LID Handbook. Therefore, erosion or loss of topsoil would not occur. **As such, Project operation would have no impact related to erosion and loss of topsoil.**

(c) Project with the Deck Concept

Given that the foundations for the vertical columns supporting the Deck would be drilled concrete piers, limited ground disturbance would be required for construction of the Deck. Given the limited ground disturbance, and implementation of the same regulatory requirements, potential impacts associated with substantial erosion or loss of topsoil would be similar under the Project or the Project with the Deck Concept. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, no impacts due to substantial erosion or loss of topsoil would occur under the Project with the Deck Concept.**

(2) Mitigation Measures

Impacts regarding substantial soil erosion or the loss of topsoil during Project construction were determined to be less than significant without mitigation and no impact would occur during Project operation. Therefore, no mitigation measures are required.

(3) Level of Significance after Mitigation

Impacts regarding substantial soil erosion or the loss of topsoil during Project construction were determined to be less than significant without mitigation, and no impact would occur during Project operation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

Threshold (c): Would the Project 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?

(1) Impact Analysis

As discussed above in Threshold (a), while Exhibit B of the Safety Element states that the Project Site is not located within an area susceptible to liquefaction, and the State of California Official Map of Seismic Hazard Zones for the Los Angeles Quadrangle also indicates that the Project Site is not located within a zone of required investigation at the Project Site.[49] Additionally, the soils at a depth of five feet or more were assessed as having very low potential for liquefaction in the Preliminary Geotechnical Report.[50] The Project Site is relatively flat, with an elevation differential of approximately five feet over its length from south to north and does not contain or is located adjacent to any steep slopes or other potential landforms subject to landslides. The Project Site is not subject to subsidence since there is no oil, gas, or groundwater extraction on or near the Project Site that could lead to localized subsidence. The nearest oil field is located approximately 0.5 miles northwest of the Project Site, too far away to affect the Project Site. The Project does not include the extraction of groundwater and thus could not cause subsidence. Lateral spreading, or the mostly horizontal movement (deformation) of soil on a flat or gently sloped surface as opposed to failure of steep slopes or vertical faces, is typically associated with underlying liquefaction, sometimes in conjunction with seismic activity. As stated above, the Project Site is considered to have low potential for liquefaction and, therefore, is at low risk of lateral spreading or collapse.

Project excavation would cause disturbance of existing soils and could, without code compliance, contribute to potential localized raveling or caving of excavated areas (e.g., the excavated side walls loosing stability). However, all required excavations would be sloped and properly shored in accordance with the applicable provisions of the CBC incorporated into the City's Building Code to minimize the potential for site stability hazards during temporary excavation activities. Per City Building Code requirements, prior to issuance of a grading permit, a qualified geotechnical engineer must prepare and submit to the LADBS a Final Geotechnical Report that includes site-specific design recommendations for seismic safety and design requirements for foundations, retaining walls/shoring and excavation to meet applicable State and City code and regulatory requirements.

Once constructed, all surfaces would be covered by pavement, landscaping, or buildings. The operations portion of the Project would have no actions that could potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Based on the above, development of the 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

[49] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.
[50] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 9.

result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. **Therefore, impacts associated with unstable geologic units or soils on the Project Site as a result of the Project would be less than significant.**

(a) Project with the Deck Concept

Construction of the Project with the Deck Concept would be extended into the Railway Properties to construct the Deck. Given limited excavation with use of drilled concrete piers as foundations to support the Decks vertical columns, and the same soil conditions and applicable regulatory requirements, impacts associated with unstable soil conditions would be the same under the Project or the Project with the Deck Concept. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, construction impacts associated with unstable geologic units or soils under the Project with the Deck Concept would be less than significant.**

During operation of the Project with the Deck Concept, the surfaces on the Project Site and the Deck would be covered by pavement, landscaping, or buildings. The surfaces underneath the Deck would remain the same as existing conditions. **Therefore, Project with the Deck Concept operation would have no impact related to unstable soil conditions.**

(2) Mitigation Measures

Impacts regarding unstable soils during Project construction were determined to be less than significant without mitigation, and no impact would occur during Project operation. Therefore, no mitigation measures are required.

(3) Level of Significance after Mitigation

Impacts regarding unstable soils during Project construction would be less than significant without mitigation, and no impact would occur during Project operation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

Threshold (d): Would the Project be located on expansive soil creating substantial risks to life or property?

(1) Impact Analysis

(a) Construction Impacts

Soils at the Project Site predominantly consist of layers of sands and silty sands to maximum explored depth of approximately 75 feet bgs. Sandy soils typically have a low expansion potential, and the Preliminary Geotechnical Report determined the Project Site to have low expansion potential.[51] Further, compliance with standard construction and

[51] Twining Consulting, Preliminary Geotechnical Report, October 30, 2018, page 13.

engineering practices (i.e., on-site excavation requiring suitable engineered stabilization in accordance with the CBC and proper engineering erosion control and proper engineering drainage design), addressing expansive soils and building code regulations pertinent to foundation stability would ensure that expansive soils are removed, as necessary. **Therefore, the Project would not be located on expansive soil creating substantial risks to life or property caused in whole or in part by its exacerbating the expansive soil conditions, and impacts would be less than significant.**

(b) Operational Impacts

Once constructed, all surfaces would be covered by pavement, landscaping, or buildings, and all shallow soils that may have been susceptible to expansion would have been removed. **Therefore, Project operation would have no impact related to expansive soil conditions.**

(c) Project with the Deck Concept

Given the same soil conditions, construction impacts associated with expansive soils would be essentially the same under the Project or the Project with the Deck Concept. Construction of the Project with the Deck Concept would similarly comply with standard construction and engineering practices as under the Project. Additionally, as previously stated, the installation of the piers for the Deck would be done in close collaboration with the railway authorities to minimize impact on rail operations. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, construction impacts under the Project with the Deck Concept would be less than significant.**

During operation of the Project with the Deck Concept, the surfaces on the Project Site and the Deck would be covered by pavement, landscaping, or buildings, and all shallow soils that may have been susceptible to expansion would have been removed. The surfaces underneath the Deck would remain the same as existing conditions. **Therefore, Project with the Deck Concept operation would have no impact related to unstable soil conditions.**

(2) Mitigation Measures

Impacts regarding expansive soils during Project construction would be less than significant, and no impact would occur during Project operation. Therefore, no mitigation measures are required.

(3) Level of Significance after Mitigation

Impacts regarding expansive soils during Project construction would be less than significant without mitigation, and no impact would occur during Project operation. Therefore, no mitigation measures were required or included, and the impact level remains less than significant.

Threshold (e): Would the Project 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 wastewater?

As discussed in Subsection VI.6, *Impacts Found Not to Be Significant*, and in the Initial Study (Appendix A-2 to this Draft EIR), the Project would be served by the municipal wastewater system and would not require septic tanks or alternative wastewater systems. **Therefore, no impact would occur with respect to septic tanks or alternative waste water disposal systems, and no further analysis is required.**

(a) Project with the Deck Concept

There would also be no septic tanks or alternative wastewater systems under the Project with the Deck Concept, as it also would be served by the municipal wastewater system. Thus, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, no impacts associated with septic tanks or alternative waste water disposal systems would occur under the Project with the Deck Concept.**

Threshold (f): Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

(1) Impact Analysis

The Project Site is relatively flat and is entirely developed with warehouses and paved surface parking and does not contain any prominent geologic or topographic features. Therefore, the Project would not destroy, permanently cover, or materially and adversely modify any distinct and prominent geologic or topographic features. As such, no Project impacts associated with landform alteration would occur, and no further analysis is required. Analysis regarding the potential for unique paleontological resources are discussed further below.

As discussed under Subsection 2.b, *Existing Conditions*, it is estimated that high paleontological sensitivity sediments could occur at or around 10 feet bgs on and around the Project Site based on the review of the geological mapping, Preliminary Geotechnical Report and literature regarding the formations, and fossil findings in the vicinity. Geotechnical analysis is not always able to identify a clear division between newer and older alluvium because of limited sample size (i.e., number of borings), potential historic disturbance (i.e., chaotic flood deposits) of the alluvial layers that may prevent clear stratification, interfingering of layers (i.e., old and new layers intermixed), and the fact that core samples were not dated, as that was beyond the scope of work for this geotechnical analysis. To the northwest and north of the Project Site, along the Harbor Freeway and US-101, a study correlating well and boring logs found that the depths of the older alluvium are highly variable, ranging from 10 and 200 feet bgs.[52] The NHMLAC records search indicated

[52] Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder, Geology of the Los Angeles Basin – an introduction, Geological Survey Professional Paper 420-A, 1965.

fossil recovery at depths of as little as 20 feet bgs in the area.[53] Given the lack of definitive information on the depth of the transition to high sensitivity sediments at the Project Site, an estimated depth of 10 feet bgs is assumed and the NHMLAC fossil localities.[54,55]

Project construction would require excavation down to approximatively 61 to 68 feet bgs for the lowest subterranean parking level, with maximum areas of excavation in isolated areas for elevator pits down to approximately 71 to 75 bgs. Therefore, Project-related grading and excavation may encounter native soil/sediment, which has a high potential for containing previously unknown buried paleontological resources. As a result, construction could directly or indirectly destroy a unique paleontological resource. **Therefore, given the potential for Project excavation to directly or indirectly destroy a unique paleontological resource, impacts would be potentially significant.**

(a) Project with the Deck Concept

Relatively limited excavation would be required to install the piers that would support the Deck and the same sensitivity for encountering unknown paleontological resources where excavation extends into native soil/sediment would occur under the Project with the Deck Concept. Nonetheless, due to the slightly larger construction footprint associated with the Deck construction, impacts associated with paleontological resources would be incrementally greater than under the Project. However, the conclusions regarding impact significance presented above are the same and apply to the Project and the Project with the Deck Concept. **As such, given the potential for the Project with the Deck Concept excavation to directly or indirectly destroy a unique paleontological resource, impacts would be potentially significant.**

(2) Mitigation Measures

The following mitigation measures are proposed to address the potential impacts on paleontological resources during Project and Project with the Deck Concept construction:

> **GEO-MM-1:** A qualified paleontologist meeting the Society of Vertebrate Paleontology (SVP) Standards[56] (Qualified Paleontologist) shall be retained prior to the approval of demolition or grading permits. The Qualified Paleontologist shall provide technical and compliance oversight of all ground-disturbing activities (e.g., clearing, grading and excavation) that relate to paleontological resources, shall attend the Project kick-off meeting and any construction progress meetings, and shall report to the Project Site in the event potential paleontological resources are encountered in order to assess the significance of the discovery and determine appropriate documentation and/or salvage.

[53] McLeod, S., Re: V Paleontological resources for the proposed 670 Mesquit Street Mixed Use Project.
[54] Yerkes, R. F., T. H. McCulloh, J. E. Schollhamer, and J. G. Vedder, Geology of the Los Angeles Basin – an introduction, Geological Survey Professional Paper 420-A, 1965.
[55] McLeod, S., Re: V Paleontological resources for the proposed 670 Mesquit Street Mixed Use Project,
[56] SVP, Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.

GEO-MM-2: The Qualified Paleontologist shall conduct construction worker paleontological resources sensitivity training prior to the start of ground-disturbing activities (including vegetation removal, pavement removal, etc.), in accordance with SVP Standards. In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on 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 demonstrating that all construction personnel attended the training.

GEO-MM-3: Full-time paleontological resources monitoring shall be conducted for all ground-disturbing activities in previously undisturbed sediments that exceed 10 feet in depth, and are, therefore, likely to impact high-sensitivity older Alluvial sediments. The surficial Alluvium has low paleontological sensitivity, and, therefore, work in the upper 10 feet of the Project Site does not need to be monitored. The Qualified Paleontologist shall spot-check the excavation on an intermittent basis and recommend revision of the depth of required monitoring based on his/her observations. The frequency of spot-checks shall be determined based on the pace of excavations, both vertically and laterally. Paleontological resources monitoring shall be performed by a qualified paleontological monitor (meeting the standards of the SVP) under the direction of the Qualified Paleontologist. Full-time monitoring can be reduced to part-time inspections or ceased entirely if determined adequate by the qualified paleontologist. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens. Any significant fossils that could yield information important to prehistory, or that embody the distinctive characteristics of a type of organism, environment, period of time, or geographic region, collected during Project-related excavations shall be prepared to the point of identification and curated into an accredited repository with retrievable storage. Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The Qualified Paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort, and shall provide the final report to the Department of City Planning.

GEO-MM-4: If construction or other Project personnel discover any potential fossils during construction, regardless of the depth of work or location, work at the discovery location shall cease within a 50-foot radius of the discovery until the Qualified Paleontologist has assessed the discovery and made recommendations as to the appropriate treatment. If the find is deemed significant, it shall be salvaged following the standards of the SVP and curated with a certified repository. If there are significant discoveries, fossil locality information and final disposition will be included within the final report which will be submitted to the appropriate repository and the Department of City Planning.

(3) Level of Significance after Mitigation

Impacts related to paleontological resources during Project construction would be reduced to less than significant with implementation of the above mitigation measures. As previously discussed under Subsection 2.a.2.g, *CEQA Guidelines*, *Paleontological Resources*, the loss of any identifiable fossil, including the unauthorized collection of fossil remains, that could yield information would be a significant environmental impact. At the Project-specific level, the implementation of paleontological mitigation can mitigate direct impacts (e.g., the loss of any identifiable fossil or the loss of information associated with the resources) to a less than significant level through the collection and identification of significant resources and by making the significant resources available for future study. During Project operation, the Project would have no impacts to paleontological resources as there would be no continuous groundbreaking and excavation activities during Project operation.

e) Cumulative Impacts

(1) Impact Analysis

Chapter III, *Environmental Setting*, of this Draft EIR provides a list of 141 projects that are planned or are under construction in the Project study area.

(a) Geology and Soils

Due to the site-specific nature of geological conditions (i.e., soils, geological features, subsurface features, seismic features, etc.), impacts associated with geology and soils are typically assessed on a project-by-project basis rather than on a cumulative basis. Nonetheless, cumulative growth, inclusive of the 141 related projects identified in Chapter III, *Environmental Setting*, of this Draft EIR, could potentially result in cumulative impacts on geology and soils. However, as with the Project, related projects would be subject to the same established guidelines and regulations pertaining to building design and seismic safety, including those set forth in the CBC and the Los Angeles Building Code. In addition, the related projects are generally commercial/residential projects that would not have the potentially to directly or indirectly exacerbate existing seismic conditions cumulatively in combination with the Project. **Therefore, considering the proposed land uses of the Project and related projects, as well as the existing regulatory requirements and regulations that would apply to all development, cumulative impacts regarding geology and soils would be less than significant.**

(b) Paleontological Resources

With regard to paleontological resources, projects within the cumulative study area for the Project include construction excavation on parcels that have been disturbed or are already developed, as well as on open space parcels, and would have the potential to disturb geological units that are sensitive for paleontological resources. Generally, projects that require substantial excavation would be subject to environmental review under CEQA. If the potential for significant impacts on paleontological resources were

identified given the site characteristics and development program of the related projects, the unmitigated impacts from the related projects, combined with the unmitigated Project impacts, could result in a potentially cumulative impact on paleontological resources. **Therefore, cumulative impacts on paleontological resources would be potentially significant.**

(c) Project with the Deck Concept

(i) Geology and Soils

Overall impacts associated with geology and soils are essentially the same under the Project or the Project with the Deck Concept, and potential impacts associated with related projects are the same. Thus, the conclusions regarding cumulative impact significance presented above apply to the Project and the Project with the Deck Concept. **Therefore, cumulative impacts associated with geology and soils under the Project with the Deck Concept would be less than significant.**

(ii) Paleontological Resources

Overall impacts associated with geology and soils are essentially the same under the Project or the Project with the Deck Concept, and potential impacts associated with related projects are the same. Thus, the conclusions regarding cumulative impact significance presented above apply to the Project and the Project with the Deck Concept. **Therefore, cumulative impacts on paleontological resources would be potentially significant.**

(2) Mitigation Measures

(a) Geology and Soils

Cumulative impacts regarding geology and soils were determined to be less than significant without mitigation for both the Project and Project with the Deck Concept. Therefore, no mitigation measures related to geology and soils are required.

(b) Paleontological Resources

Cumulative impacts to paleontological resources from related projects are considered potentially significant for both the Project and Project with the Deck Concept. The Project however, would be required to implement Mitigation Measures GEO-MM-1 through GEO-MM-4.

(3) Level of Significance after Mitigation

(a) Geology and Soils

Cumulative impacts related to geology and soils would be less than significant without additional mitigation measures under both the Project and Project with the Deck Concept.

(b) Paleontological Resources

Cumulative impacts related to paleontological resources under both the Project and Project with the Deck Concept would be potentially significant prior to implementation of mitigation measures. With implementation of Mitigation Measures GEO-MM-1 through GEO-MM-4, Project and Project with the Deck Concept impacts would be reduced to a less than significant level. As paleontological resources, if encountered during excavation, would be protected and recovered and would contribute to the body of scientific knowledge of paleontological resources, the Project's contribution to cumulative impacts would not be cumulatively considerable and, therefore, would be less than significant.

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