IV. Environmental Impact Analysis

F. Geology and Soils

1. Introduction

This section evaluates potential geologic and soils hazards of the Project, including the potential for the Project to cause direct or indirect impacts associated with existing environmental conditions that could cause, in whole or in part, fault rupture, ground shaking, liquefaction of soils, expansion of soils, and/or landslide. Impacts regarding these topics are based on the *Soils and Geology Evaluation to Support the Environmental Impact Report* (Soils and Geology Evaluation),[1] prepared by Geotechnologies, Inc. and provided as Appendix G of this Draft EIR. This section also evaluates the potential for the Project to directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

2. Environmental Setting

a. Regulatory Framework

There are several plans, regulations, and programs that include policies, requirements, and guidelines regarding Geology and Soils (including paleontological resources) at the federal, state, regional, and local levels. As described below, these plans, guidelines, and laws include the following:

- Earthquake Hazards Reduction Act
- National Pollutant Discharge Elimination System (NPDES)
- Society for Vertebrate Paleontology Standard Guidelines
- Alquist-Priolo Earthquake Act
- Seismic Hazards Mapping Act
- California Building Code

[1] *Geotechnologies, Inc., Soils and Geology Evaluation to Support the Environmental Impact Report, Proposed Metro's Transportation Communication Network, August 23, 2022.*

- California Public Resources Code (PRC) Section 5097.5
- Metro Rail Design Criteria (MRDC)
- Los Angeles General Plan Safety Element
- General Plan Conservation Element
- Los Angeles Municipal Code (LAMC)

(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 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.[2]

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[2] *U.S. EPA, Clean Water Act, Section 402: National Pollutant Discharge Elimination System, www.epa.gov/cwa-404/clean-water-act-section-402-national-pollutant-discharge-elimination-system, accessed May 23, 2022.*

(c) Society for Vertebrate Paleontology Standard Guidelines

The Society for Vertebrate Paleontology (SVP) has established standard guidelines 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,[3] 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 paleontologist, specialists, or special interest groups, or by lead agencies or local governments.*

As defined by the SVP,[4] 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,[5] all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because

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[3] *Society of Vertebrate Paleontology, "Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines," Society of Vertebrate Paleontology News Bulletin 163:22 27, 1995.*

[4] *Society of Vertebrate Paleontology, "Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines."*

[5] *Society of Vertebrate Paleontology, "Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines."*

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 Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act) was signed into law December 22, 1972 (revised in 1994), and codified into State law in the Public Resources Code as Division 2, Chapter 7.5 to address hazards from earthquake fault zones. The purpose of this law is to mitigate the hazard of surface fault rupture by regulating development near active faults. As required by the Act, the State has delineated Earthquake Fault Zones (formerly Special Studies Zones) along known active faults in California, which vary in width around the fault trace from about 200 to 500 feet on either side of the fault trace. Cities and counties affected by the zones must regulate certain development projects within the zones. The State Geologist is also required to issue appropriate maps to assist cities and counties in planning, zoning, and building regulation functions. Local agencies enforce the Alquist-Priolo Earthquake Fault Zoning Act in the development permit process, where applicable, and may be more restrictive than State law requires. According to the Alquist-Priolo Earthquake Fault Zoning Act, before a project that is within an Alquist-Priolo Earthquake Fault Zone can be permitted, cities and counties shall require a geologic investigation, prepared by a licensed geologist, to demonstrate that buildings will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back a distance to be established by a California Certified Engineering Geologist. Although setback distances may vary, a minimum 50-foot setback is typically required.

(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 (Public Resources Code Sections 2690-2699.6). Under the Seismic Hazards Mapping Act, the State Geologist is required to delineate “seismic hazard zones.” Cities and counties must regulate certain development projects within these zones until the geologic and soil conditions of their project site 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 Plans and to encourage the adaptation of land use management policies and regulations to reduce and mitigate seismic 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.

(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 facilities, 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 those standards 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. 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 became effective January 1, 2020. Every three years, the State adopts new codes (known collectively as the California Building Standards Code) to establish uniform standards for the construction and maintenance of buildings, electrical systems, plumbing systems, mechanical systems, and fire and life safety systems. Sections 17922, 17958 and 18941.5 of the California Health and Safety Code require that the latest edition of the California Building Standards Code apply to local construction 180 days after publication. The significant changes to Title 24 in the 2019 edition can be found at California Department of General Services website.[6]

(d) California PRC Section 5097.5

California PRC Section 5097.5 provides protection for paleontological resources on public lands, where Section 5097.5(a) states, in part, that:

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[6] *California Department of General Services, California Building Standards Code, www.dgs.ca.gov/BSC/Codes#@ViewBag.JumpTo/, accessed May 23 ,2022.*

No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands.

(3) Regional

(a) Metro Rail Design Criteria

The Metro Rail Design Criteria (MRDC) specifies the criteria and applicable codes that address and mitigate for geologic and seismic hazards for all Metro transit projects and their associated facilities, including underground facilities, bridges, stations, rail infrastructure, and other infrastructures including signs and poles. All new structures must be designed to resist the earthquake forces and ground displacement stipulated in the criteria. Section 5 of the MRDC dictates the required seismic performance criteria for structures. For structures other than guideways and bridges, and underground structures subject to railroad or highway loading, the MRDC adopts the latest version of the California Building Code, California Code of Regulations, Title 24, Part 2, California Building Standards Commission, based on the International Building Code.

(4) Local

(a) City of Los Angeles General Plan

(i) 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.

(ii) Conservation Element

The City's General Plan Conservation Element recognizes paleontological resources in Section 3: "Archeological and Paleontological" and 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. Section 3 of the Conservation Element, adopted in September 2001, includes policies for the protection of paleontological resources. As stated therein, it is the City's objective that paleontological resources be protected for historical, cultural research, and/or educational purposes. Section 3 sets as a policy to continue the identification and protection of significant paleontological sites and/or resources known to exist or that are identified during "land development, demolition, or property modification activities."

(b) Los Angeles Municipal Code

Chapter IX of the LAMC contains the City's Building Code, which incorporates by reference the CBC, with City amendments for additional requirements. The function of the City's Building Code, is to protect life safety and ensure compliance with the LAMC. Chapter IX addresses 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, landslides, and unstable soils. Additionally, the LAMC includes specific requirements addressing seismic design, grading, foundation design, geologic investigations and reports, soil and rock testing, and groundwater.

b. Existing Conditions

(1) Regional Geology

The Site Locations have been mapped within eight geologic quadrangle maps that are included in Exhibit B of the Geology and Soils Evaluation. As shown therein, the Site locations are located within the Transverse Ranges Geomorphic Province and within the Los Angeles Basin of the northern portion of the Peninsular Ranges Geomorphic Province. The Transverse Ranges are characterized by roughly east-west trending mountains and the northern and southern boundaries are formed by reverse fault scarps. The convergent deformational features of the Transverse Ranges are a result of north-south shortening due to plate tectonics. This has resulted in local folding and uplift of the mountains along with the propagation of thrust faults (including blind thrusts). The intervening valleys have been filled with sediments derived from the bordering mountains.

The Peninsular Ranges Geomorphic Province is characterized by northwest-trending blocks of mountain ridges and sediment-floored valleys. The Los Angeles Basin is located at the northern end of the Peninsular Ranges Geomorphic Province. The basin is bounded to the east and southeast by the Santa Ana Mountains and San Joaquin Hills, and to the northwest by the Santa Monica Mountains. Over 22 million years ago, the Los Angeles Basin was a deep marine basin formed by tectonic forces between the North American and Pacific plates. Since that time, over 5 miles of marine and non- marine sedimentary rock, as well as intrusive and extrusive igneous rocks, have filled the basin. During the last two million years, defined by the Pleistocene and Holocene epochs, the Los

Angeles basin and surrounding mountain ranges have been uplifted to form the present day landscape. Erosion of the surrounding mountains has resulted in deposition of unconsolidated sediments in low-lying areas by rivers such as the Los Angeles River. Areas that have experienced subtle uplift have been eroded with gullies.

(2) Regional Faulting

Based on criteria established by the California Geological Survey (CGS), faults may be categorized as Holocene-active, pre-Holocene faults, and age-undetermined faults. Holocene-active faults are those that show evidence of surface displacement within the last 11,700 years. Pre-Holocene faults are those that have not moved in the past 11,700 years. Age-undetermined faults are faults where the recency of fault movement has not been determined.

Buried thrust faults are faults without a surface expression but are a significant source of seismic activity. They are typically broadly defined based on the analysis of seismic wave recordings of hundreds of small and large earthquakes in the southern California area. Due to the buried nature of these thrust faults, their existence is usually not known until they produce an earthquake. The risk for surface rupture potential of these buried thrust faults is inferred to be low. However, the seismic risk of these buried structures in terms of recurrence and maximum potential magnitude is not well established. Therefore, the potential for surface rupture on these surface-verging splays at magnitudes higher than 6.0 cannot be precluded. An overview of the various faults within the general vicinity of the Project is provided below. The proximity of the Site Locations to these various faults are mapped in Figure IV.F-1 through Figure IV.F-6 on pages IV.F-9 through IV.F-14.

(a) Holocene Active Faults

(i) Santa Monica Fault

The Santa Monica fault extends east from the coastline in Pacific Palisades through Santa Monica and West Los Angeles and merges with the Hollywood fault at the West Beverly Hills Lineament in Beverly Hills where its strike is northeast. It is believed that at least six surface ruptures have occurred in the past 50 thousand years. In addition, a well-documented surface rupture occurred between 10 and 17 thousand years ago, although a more recent earthquake probably occurred one to three thousand years ago. This leads to an average earthquake recurrence interval of seven to eight thousand years. It is thought that the Santa Monica fault system may produce earthquakes with a maximum magnitude of 7.4.

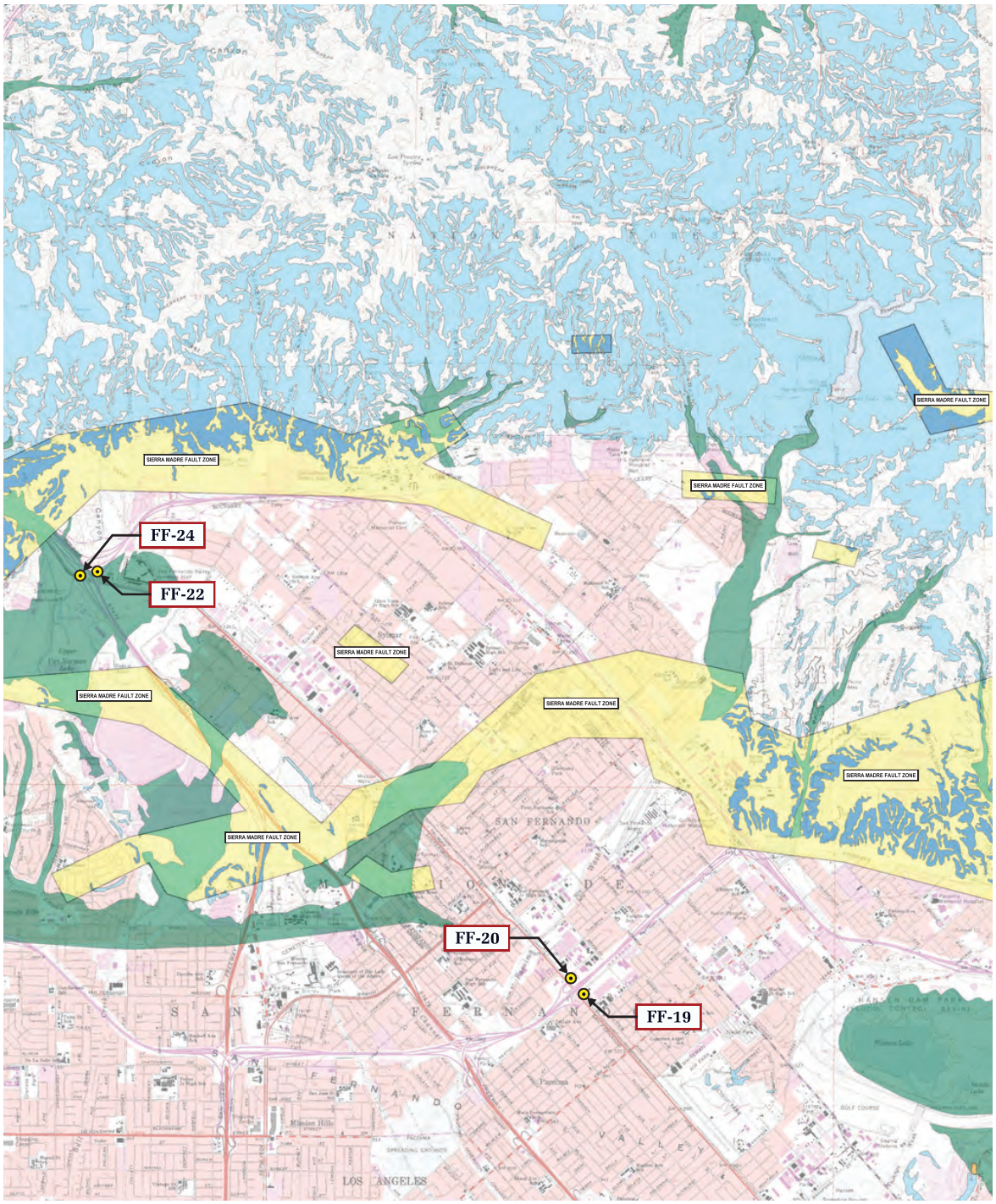
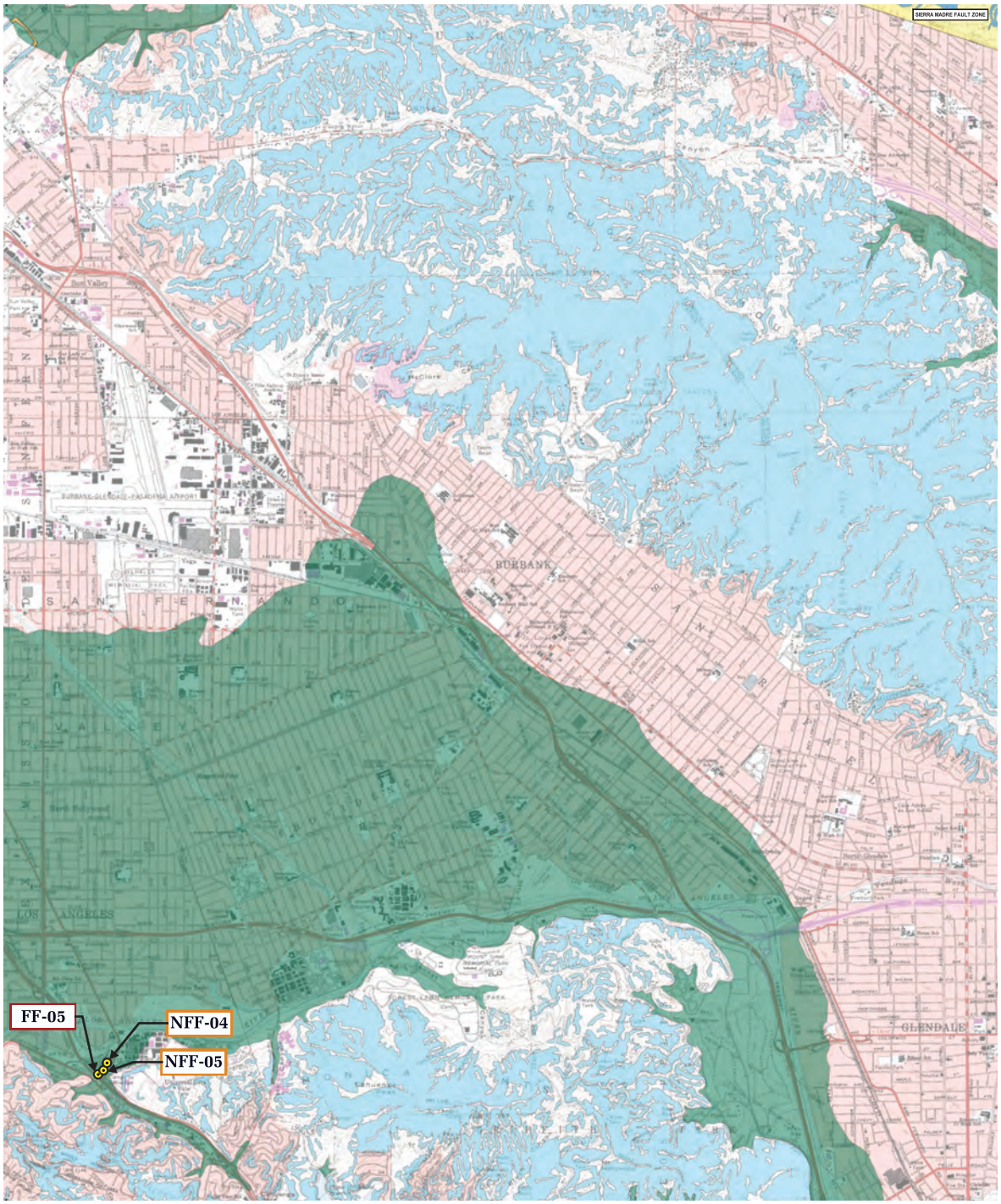


Figure IV.F-1

Earthquake Zones – San Fernando Quadrangle

Source: California Geological Survey, January, 1979.



Scale 1: 24000

LEGEND

FF-34 LOCATION AND NUMBER OF FREEWAY FACING TCN STRUCTURE

NFF-22 LOCATION AND NUMBER OF NON-FREEWAY FACING TCN STRUCTURE

EARTHQUAKE FAULT ZONES
ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE

LIQUEFACTION AREA

N

Figure IV.F-2

Earthquake Zones – Burbank Quadrangle

Source: California Geological Survey, January, 1979.

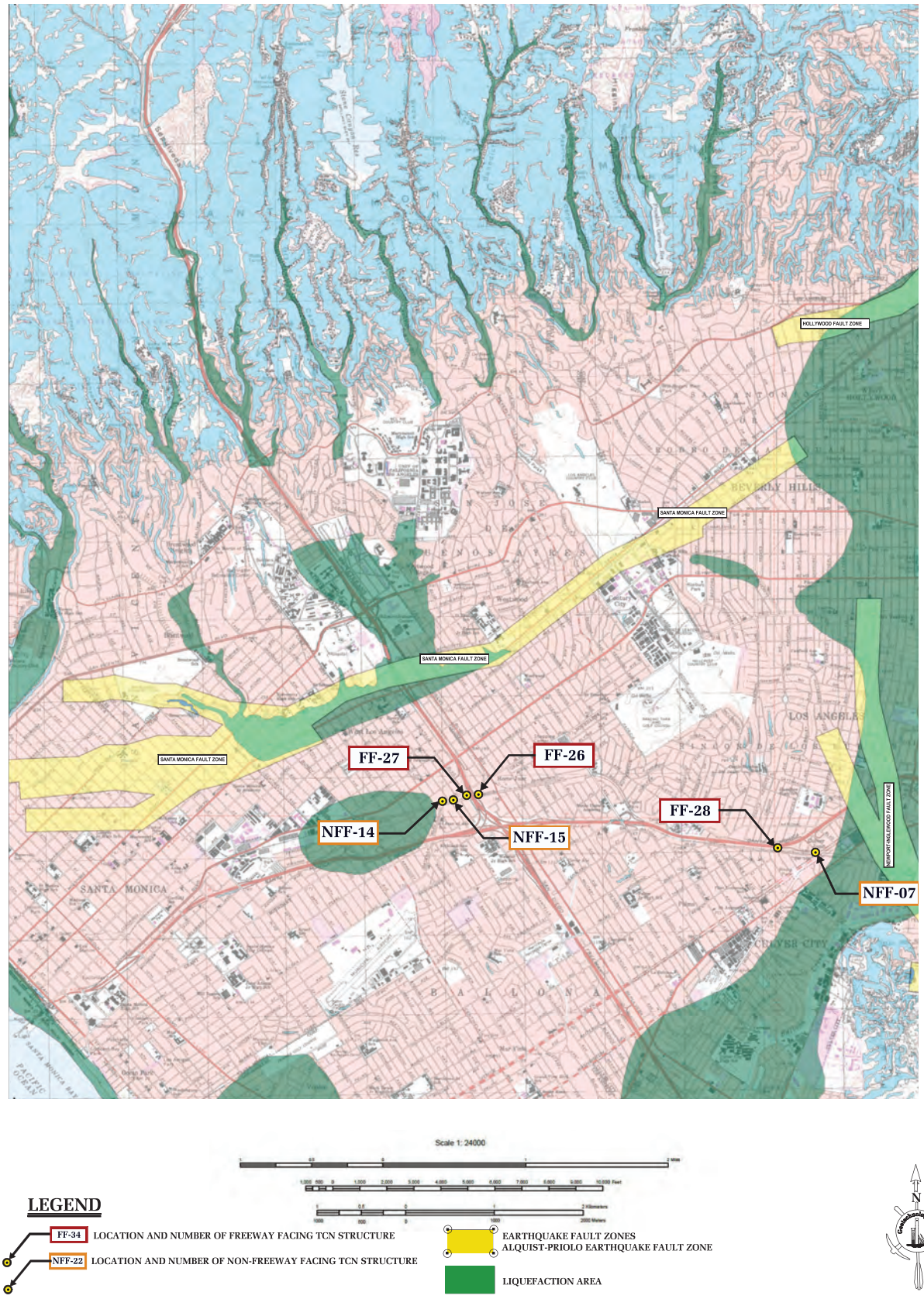


Figure IV.F-3

Earthquake Zones – Beverly Hills Quadrangle

Source: California Geological Survey, January, 1979.

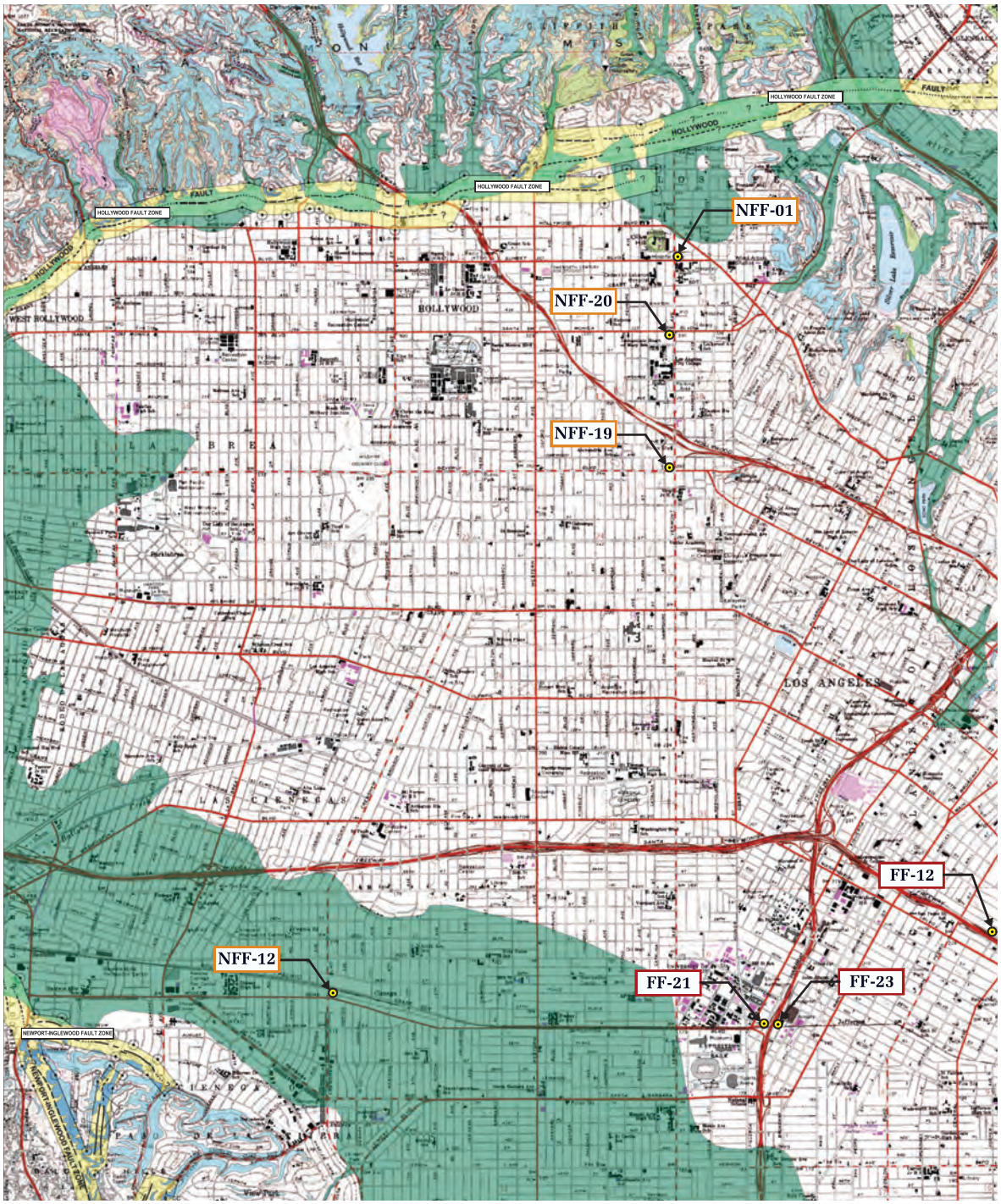
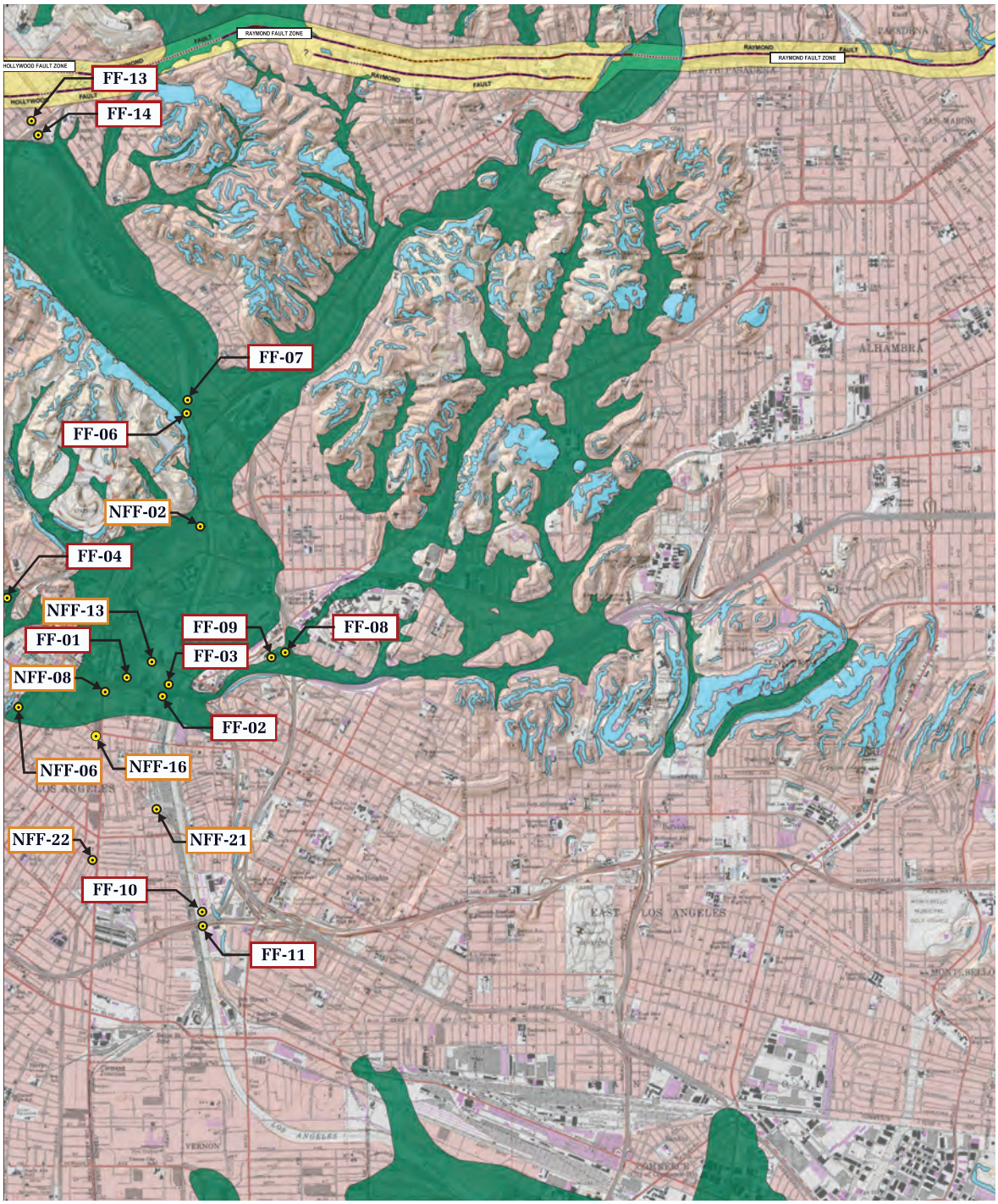


Figure IV.F-4

Earthquake Zones – Hollywood Quadrangle

Source: California Geological Survey, January, 1979.



Scale 1: 24000

LEGEND

- FF-34 — LOCATION AND NUMBER OF FREEWAY FACING TCN STRUCTURE
- NFF-22 — LOCATION AND NUMBER OF NON-FREEWAY FACING TCN STRUCTURE
- EARTHQUAKE FAULT ZONES
  ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE
- LIQUEFACTION AREA

N

Figure IV.F-5

Earthquake Zones – Los Angeles Quadrangle

Source: California Geological Survey, January, 1979.

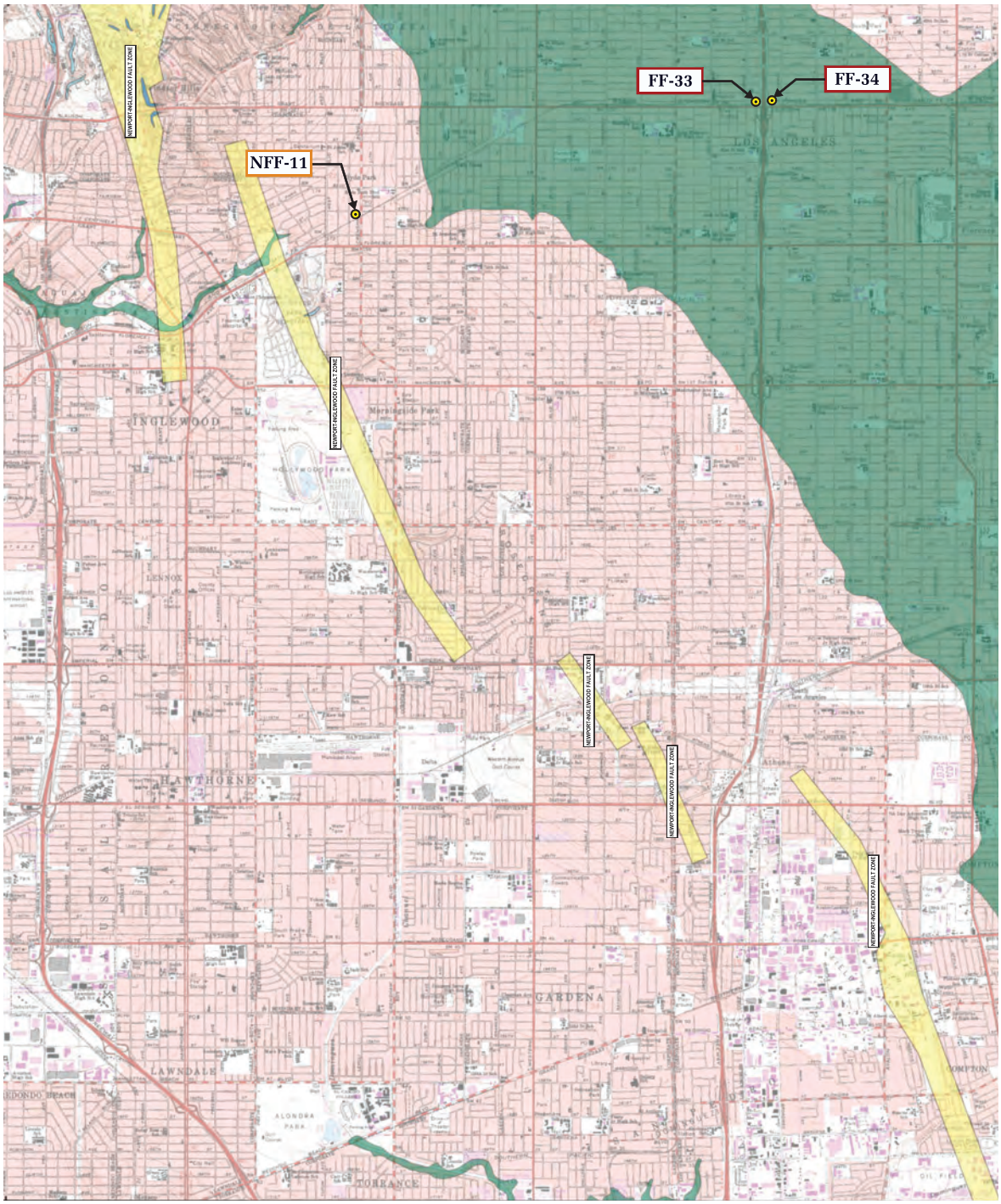


Figure IV.F-6

Earthquake Zones – Inglewood Quadrangle

Source: California Geological Survey, January, 1979.

(ii) Hollywood Fault

The Hollywood fault is part of the Transverse Ranges Southern Boundary fault system. This fault trends east-west along the base of the Santa Monica Mountains from the West Beverly Hills Lineament in the West Hollywood–Beverly Hills area to the Los Feliz area of Los Angeles. The Hollywood fault is the eastern segment of the reverse oblique Santa Monica–Hollywood fault. Based on geomorphic evidence, stratigraphic correlation between exploratory borings, and fault trenching studies, this fault is classified as active.

Until recently, the approximately 9.3-mile-long Hollywood fault was considered to be expressed as a series of linear ground-surface geomorphic expressions and south-facing ridges along the south margin of the eastern Santa Monica Mountains and the Hollywood Hills. Multiple recent fault rupture hazard investigations have shown that the Hollywood fault is located south of the ridges and bedrock outcroppings along portions of Sunset Boulevard. The Hollywood fault has not produced any damaging earthquakes during the historical period and has had relatively minor micro-seismic activity. It is estimated that the Hollywood fault is capable of producing a maximum 6.7 magnitude earthquake.

(iii) Raymond Fault

The Raymond fault is an effective groundwater barrier which divides the San Gabriel Valley into groundwater sub-basins. Much of the geomorphic evidence for the Raymond fault has been obliterated by urbanization of the San Gabriel Valley. However, a discontinuous escarpment can be traced from Monrovia to the Arroyo Seco in South Pasadena. The very bold, “knife edge” escarpment in Monrovia parallel to Scenic Drive is believed to be a fault scarp of the Raymond fault. Trenching of the Raymond fault is reported to have revealed Holocene movement. The recurrence interval for the Raymond fault is probably slightly less than 3,000 years, with the most recent documented event occurring approximately 1,600 years ago. It is believed that the Raymond fault is capable of producing a 6.8 magnitude earthquake.

(iv) Newport–Inglewood Fault System

The Newport–Inglewood fault zone is a broad zone of discontinuous north to northwestern echelon faults and northwest to west trending folds. The fault zone extends southeastward from West Los Angeles, across the Los Angeles Basin, to Newport Beach and possibly offshore beyond San Diego. The onshore segment of the Newport–Inglewood fault zone extends for about 37 miles from the Santa Ana River to the Santa Monica Mountains. Here it is overridden by, or merges with, the east-west trending Santa Monica zone of reverse faults.

From the northern end to its southernmost onshore expression, the Newport–Inglewood fault zone is made up of: Cheviot Hills, Baldwin Hills, Rosecrans Hills,

Dominguez Hills, Signal Hill-Reservoir Hill, Alamitos Heights, Landing Hill, Bolsa Chica Mesa, Huntington Beach Mesa, and Newport Mesa. Several single and multiple fault strands, make up the fault zone and account for the uplifted mesas. It is believed that the Newport–Inglewood fault zone is capable of producing a 7.5 magnitude earthquake.

(v) Verdugo Fault

The Verdugo Fault runs along the southwest edge of the Verdugo Mountains. The fault displays a reverse motion. According to Weber, et. al., two to three meter high scarps were identified in alluvial fan deposits in the Burbank and Glendale areas. Further to the northeast, in Sun Valley, a fault was reportedly identified at a depth of 40 feet in a sand and gravel pit. Although considered active by the County of Los Angeles Department of Public Works and the United States Geological Survey, the fault is not designated with an Earthquake Fault Zone by the California Geological Survey. It is estimated that the Verdugo Fault is capable of producing a maximum 6.9 magnitude earthquake.

(vi) Whittier–Elsinore Fault System

The Whittier fault together with the Chino fault comprises the northernmost extension of the northwest trending Elsinore fault system. The mapped surface of the Whittier fault extends in a west-northwest direction for a distance of 20 miles from the Santa Ana River to the terminus of the Puente Hills. The Whittier fault is essentially a strike-slip, northeast dipping fault zone which also exhibits evidence of reverse movement. It is believed that the Whittier fault is capable of producing a 7.8 magnitude earthquake.

(vii) Sierra Madre Fault System

The Sierra Madre fault alone forms the southern tectonic boundary of the San Gabriel Mountains in the northern San Fernando Valley. It consists of a system of faults approximately 75 miles in length. The individual segments of the Sierra Madre fault system range up to 16 miles in length and display a reverse sense of displacement and dip to the north. The most recently active portions of the zone include the Mission Hills, Sylmar and Lakeview segments, which produced an earthquake in 1971 of magnitude 6.4. Tectonic rupture along the Lakeview Segment during the San Fernando Earthquake of 1971 produced displacements of approximately 2.5 to 4 feet upward and southwestward. It is believed that the Sierra Madre fault zone is capable of producing an earthquake of magnitude 7.3.

(viii) Malibu Coast Fault

The Malibu Coast fault is part of the Transverse Ranges Southern Boundary fault system, a west- trending system of reverse, oblique-slip, and strike-slip faults that extends for more than approximately 124 miles along the southern edge of the Transverse Ranges

and includes the Hollywood, Raymond, Anacapa–Dume, Malibu Coast, Santa Cruz Island, and Santa Rosa Island faults.

The Malibu Coast fault zone runs in an east-west orientation onshore subparallel to and along the shoreline for a linear distance of about 17 miles through the Malibu City limits, but also extends offshore to the east and west for a total length of approximately 37.5 miles. While the Malibu Coast Fault Zone has not been officially designated as an active fault zone by the State of California and no Special Studies Zones have been delineated along any part of the fault zone under the Alquist-Priolo Act of 1972, evidence for Holocene activity (movement in the last 11,000 years) has been established in several locations along individual fault splays within the fault zone. Due to such evidence, several fault splays within the onshore portion of the fault zone are identified as active. Large historic earthquakes along the Malibu Coast fault include the 1979, 5.2 magnitude earthquake and the 1989, 5.0 magnitude earthquake. The Malibu Coast fault zone is believed to be capable of producing a maximum 7.0 magnitude earthquake.

(ix) Palos Verdes Fault

Studies indicate that there are several active on-shore extensions of the strike-slip Palos Verdes fault. Geophysical data also indicate the off-shore extensions of the fault are active, offsetting Holocene age deposits. This fault is considered active by the California Geological Survey and is estimated to be capable of producing a maximum 7.7 magnitude earthquake.

(x) San Gabriel Fault System

The San Gabriel fault system comprises a series of subparallel, steeply north-dipping faults trending approximately north 40 degrees west with a right-lateral sense of displacement. There is also a small component of vertical dip-slip separation. The estimated right lateral displacement on the fault varies from 34 miles to 40 miles, to 10 miles. Most scholars accept the larger displacement values and place the majority of activity between the Late Miocene and Late Pliocene Epochs of the Tertiary Era (65 to 1.8 million years before present).

Portions of the San Gabriel fault system are considered active by the California Geological Survey. Recent seismic exploration in the Valencia area has established a Holocene offset. Radiocarbon data acquired by Cotton indicate that faulting in the Valencia area occurred between 3,500 and 1,500 years before present. Seismic evidence indicates that the San Gabriel fault system is truncated at depth by the younger, north-dipping Santa Susana–Sierra Madre faults.

(xi) Santa Susana Fault

The Santa Susana fault extends approximately 17 miles west-northwest from the northwest edge of the San Fernando Valley into Ventura County and is at the surface high on the south flank of the Santa Susana Mountains. The fault ends near the point where it overrides the south-side-up South strand of the Oak Ridge fault. The Santa Susana fault strikes northeast at the Fernando lateral ramp and turns east at the northern margin of the Sylmar Basin to become the Sierra Madre fault. This fault is exposed near the base of the San Gabriel Mountains for approximately 46 miles from the San Fernando Pass at the Fernando lateral ramp east to its intersection with the San Antonio Canyon fault in the eastern San Gabriel Mountains, east of which the range front is formed by the Cucamonga fault. The Santa Susana fault has not experienced any recent major ruptures except for a slight rupture during the 6.5 magnitude 1971 Sylmar earthquake. The Santa Susana Fault is considered to be active by the County of Los Angeles. It is believed that the Santa Susana fault has the potential to produce a 6.9 magnitude earthquake.

(xii) San Andreas Fault System

The San Andreas Fault system forms a major plate tectonic boundary along the western portion of North America. The system is predominantly a series of northwest trending faults characterized by a predominant right lateral sense of movement.

The San Andreas and associated faults have had a long history of inferred and historic earthquakes. Cumulative displacement along the system exceeds 150 miles in the past 25 million years. Large historic earthquakes have occurred at Fort Tejon in 1857, at Point Reyes in 1906, and at Loma Prieta in 1989. Based on single-event rupture length, the maximum Richter magnitude earthquake is expected to be approximately 8.25. The recurrence interval for large earthquakes on the southern portion of the fault system is approximately 100 to 200 years.

(b) Pre-Holocene Faults

(i) Anacapa–Dume Fault

The Anacapa–Dume fault is a near-vertical offshore escarpment exceeding 600 meters locally, with a total length exceeding 62 miles. This fault is also part of the Transverse Ranges Southern Boundary fault system. It occurs as close as 3.6 miles offshore south of Malibu at its western end, but trends northeast where it merges with the offshore segments of the Santa Monica Fault Zone. It is believed that the Anacapa–Dume fault is responsible for generating the historic 1930 magnitude 5.2 Santa Monica earthquake, the 1973 magnitude 5.3 Point Mugu earthquake, and the 1979 and 1989 Malibu earthquakes, each of which possessed a magnitude of 5.0. The Anacapa–Dume fault is thought to be capable of producing a maximum magnitude 7.2 earthquake.

(c) Blind Thrust Faults

Blind or buried thrust faults are faults without a surface expression but are a significant source of seismic activity. By definition, these faults have no surface trace, therefore the potential for ground surface rupture is considered remote. They are typically broadly defined based on the analysis of seismic wave recordings of hundreds of small and large earthquakes in the Southern California area. Due to the buried nature of these thrust faults, their existence is sometimes not known until they produce an earthquake. Two blind thrust faults in the Los Angeles metropolitan area are the Puente Hills blind thrust and the Elysian Park blind thrust. Another blind thrust fault of note is the Northridge fault located in the northwestern portion of the San Fernando Valley.

The Elysian Park anticline is thought to overlie the Elysian Park blind thrust. This fault has been estimated to cause an earthquake every 500 to 1,300 years in the magnitude range 6.2 to 6.7.

The Puente Hills blind thrust fault extends eastward from Downtown Los Angeles to the City of Brea in northern Orange County. The Puente Hills blind thrust fault includes three north-dipping segments, named from east to west as the Coyote Hills segment, the Santa Fe Springs segment, and the Los Angeles segment. These segments are overlain by folds expressed at the surface as the Coyote Hills, Santa Fe Springs Anticline, and the Montebello Hills.

The Santa Fe Springs segment of the Puente Hills blind thrust fault is believed to be the cause of the October 1, 1987, Whittier Narrows Earthquake. Based on deformation of late Quaternary age sediments above this fault system and the occurrence of the Whittier Narrows earthquake, the Puente Hills blind thrust fault is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin. A maximum moment magnitude of 7.0 is estimated by researchers for the Puente Hills blind thrust fault.

The moment magnitude (Mw) 6.7 Northridge earthquake was caused by the sudden rupture of a previously unknown, blind thrust fault. This fault has since been named the Northridge Thrust. However it is also known in some of the literature as the Pico Thrust. It has been assigned a maximum magnitude of 6.9 and a 1,500 to 1,800 year recurrence interval.

(3) Surface Ground Rupture and Seismicity

As previously discussed, in 1972, the Alquist-Priolo Special Studies Zones Act (now known as the Alquist-Priolo Earthquake Fault Zoning Act) was passed into law. As revised in 2018, the Act defines “Holocene-active” Faults utilizing the same aging criteria as that used by CGS. However, established state policy has been to zone only those faults which

have direct evidence of movement within the last 11,700 years. It is this recency of fault movement that the CGS considers as a characteristic for faults that have a relatively high potential for ground rupture in the future.

CGS policy is to delineate a boundary from 200 to 500 feet wide on each side of the Holocene-active fault trace based on the location precision, the complexity, or the regional significance of the fault. If a site lies within an Earthquake Fault Zone, a geologic fault rupture investigation must be performed that demonstrates that the proposed building site is not threatened by surface displacement from the fault before development permits may be issued. Figure IV.F-1 through Figure IV.F-6 on pages IV.F-9 through IV.F-14 show the locations of the proposed Site Locations relative to the local Earthquake Fault Zones.

Ground rupture is defined as surface displacement which occurs along the surface trace of the causative fault during an earthquake. Based on research of available literature and results of site reconnaissance, no known Holocene-active or pre-Holocene faults underlie any of the proposed Site Locations. In addition, the Site Locations are not located within an Alquist-Priolo Earthquake Fault Zone. Based on these considerations, the potential for surface ground rupture at the Site Locations are considered low. Notwithstanding, as with all of Southern California, the proposed Site Locationsare subject to potential strong ground motion, should a moderate to strong earthquake occur on a local or regional fault.

(4) Regional Subsidence and Landslides

Based on review of the interactive Areas of Land Subsidence in California Map (USGS), none of the Site Locations are found within a zone of known subsidence due to oil or groundwater withdrawal. In addition, as discussed in the Geology and Soils Evaluation, the probability of seismically-induced landslides occurring on the Site Locations is considered to be remote, due to the general lack of substantive elevation difference across or immediately adjacent to the site. Based on review of the Local Geologic Maps (Refer to Exhibit B of the Geology and Soils Evaluation) and Seismic Hazards Zone Maps (refer to Exhibit D of the Geology and Soils Evaluation), the Site Locations are not found within a known landslide area, or within a zone considered susceptible to seismically-induced landslides.

(5) Site Specific Geologic Conditions

This section provides a summary of the anticipated subsurface conditions and geologic hazards for each Site Location described below:

- Surface Rupture: The visible breaking and displacement of the earth’s surface along the trace of a fault during an earthquake.

- Geologic Materials: Rock and soil such as silt, sand, clay and gravel

- Groundwater Conditions: The depth at which groundwater occurs or has been known to occur in the past.

- Nearest Fault: The nearest extended break in a body of rock, marked by the relative displacement and discontinuity of strata on either side of a particular surface

- Liquefaction: A phenomenon whereby saturated, granular soils lose their inherent shear strength due to excess pore water pressure buildup, such as that generated during repeated cyclic loading from an earthquake. Liquefaction is associated primarily with low density, granular, saturated soil in areas where the groundwater table is 50 feet or less bgs. Liquefaction-related effects can include sand boils, excessive settlement, bearing capacity failures, and lateral spreading.

- Collapsible Soils: Soils which typically consist of loose, dry, low-density materials that collapse and compact under the addition of water or excessive loading. The resulting hydroconsolidation can result in foundation settlement or movement over long periods of wetting.

- Expansive Soils: Soils which generally consist of clays that can shrink and swell with changes in moisture content. Movement of soils in response to shrinkage and swelling has the potential to impact near-surface improvements such as lightly loaded foundations, floor slabs, and flatwork.

- Landslide: The movement of a mass of rock, debris, or earth down a slope. Landslides generally occur in loosely consolidated, wet soil and/or rocks on steep sloping terrain.

- Lateral Spreading: The most common type of liquefaction-induced ground failure. Lateral spreading is a phenomenon in which large blocks of intact, non-liquefied soil move downslope on a liquefied soil layer. Lateral spreading is often a regional event. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area, such as an unlined river channel.

- Subsidence: When a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas.

- Erosion: The process of eroding or being eroded by wind, water, or other natural agents.

The anticipated subsurface conditions are based on the review of the previous geotechnical investigations prepared within the vicinity of the Site Locations as well as published geologic and seismic hazard maps which are included as part of the Soils and Geology Evaluation. With regard to subsurface ground rupture, as discussed above, no

known Holocene-active or pre-Holocene faults underlie the Site Locations. In addition, the Site Locations are not located within an Alquist-Priolo Earthquake Fault Zone. Based on these considerations, the potential for surface ground rupture at the Site Locations are considered low. Lastly, the subsurface conditions beneath the static displays to be removed are anticipated to vary by location and be generally similar to the various conditions that exist at the Site Locations below. Ground disturbance associated with the removal of static displays would be temporary and minimal.

(a) Freeway Facing TCN Structures

(i) FF-1

Geologic Materials

The geologic materials at this Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 80 to 120 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet in depth below the existing site grade. Additionally, the historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.9 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(ii) FF-2 and FF-3

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to

consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet in depth below the existing grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Upper Elysian Park Fault, which is located approximately 0.9 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(iii) FF-4

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by a thin mantle of native alluvial soils, which are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation should be expected at a relatively shallow depth, potentially within the upper 20 feet strata. The on-site geologic materials are expected to be in the moderate to high expansion range.

Groundwater Conditions

Water seepage should be expected on top of the bedrock contact. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.8 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(iv) FF-5

Geologic Materials

The geologic materials at this Site Location consists of a limited amount of fill materials, underlain by native alluvial soils, which are anticipated to consist of a mixture of sand and silt. Bedrock of the Upper Topanga Formation should be expected underlying the native alluvial soils. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 15 and 30 feet in depth below the existing site grade. The historically highest groundwater level is approximately 10 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Hollywood Fault, which is located approximately 2.5 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Burbank Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(v) FF-6 and FF-7

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 10 to 30 feet below the ground surface. The on-site geologic materials are expected to be in the very low to low expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet in depth below the existing grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Upper Elysian Park Fault, which is located approximately 1.1 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(vi) FF-8 and FF-9

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Anticipated Groundwater Conditions

Groundwater should be expected at depths between 25 and 40 feet in depth below the existing grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Upper Elysian Park Fault, which is located approximately 0.6 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(vii) FF-10 and FF-11

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 80 feet below grade. The historically highest groundwater level is approximately 150 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Upper Elysian Park Fault, which is located approximately 2.5 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(viii) FF-12

Geologic Materials

It is anticipated that the geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected to be deeper than 80 feet in depth below the existing site grade. The historically highest groundwater level is approximately 80 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Puente Hills Fault, which is located approximately 2.4 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(ix) FF-13 and FF-14

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth between 30 and 40 feet below grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Hollywood Fault, which is located approximately 0.5 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(x) FF-15 and FF-16

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 70 feet below grade. The historically highest groundwater level is approximately 70 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Verdugo Fault, which is located approximately 2.5 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xi) FF-17 and FF-18

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 150 feet below grade. The historically highest groundwater level is approximately 150 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations correspond to the Verdugo Fault, which is located approximately 0.25 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xii) FF-19 and FF-20

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 70 feet below grade. The historically highest groundwater level is approximately 70 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Verdugo Fault, which is located approximately 0.9 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the San Fernando Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xiii) FF-21 and FF-23

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 70 feet below grade. The historically highest groundwater level is approximately 60 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Puente Hills Fault, which is located approximately 2.7 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xiv) FF-22 and FF-24

Geologic Materials

The geologic materials at these Site Locations consist of potentially deep fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 30 feet below grade. The historically highest groundwater level is approximately 30 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Santa Susana Fault, which is located approximately 0.7 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the San Fernando Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(xv) FF-25

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils, which are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below grade. The historically highest groundwater level is approximately 30 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Verdugo Fault, which is located approximately 6.0 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the Site Location is located within a “Liquefiable” area.

(xvi) FF-26 and FF-27

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, clay and silt. The on-site geologic materials are expected to be in the low to high expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 50 feet below grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Santa Monica Fault, which is located approximately 0.7 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Beverly Hills Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xvii) FF-28

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils, which are anticipated to consist of a mixture of sand, silt and clay. Marine Sediments should be expected to underlie the native alluvial soils, at depths ranging between 30 and 40 feet below the existing grade. The on-site geologic materials are expected to be in the very low to high expansion range.

Anticipated Groundwater Conditions

Groundwater should be expected at depths between 30 and 45 feet below grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Newport–Inglewood Fault, which is located approximately 0.6 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Beverly Hills Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xviii) FF-29 and FF-30

Anticipated Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, clay and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Anticipated Groundwater Conditions

Groundwater should be expected at a depth between 10 and 20 feet below grade. The historically highest groundwater level is approximately 5 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Newport–Inglewood Fault, which is located approximately 3.7 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Venice Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(xix) FF-31 and FF-32

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, clay and silt. The on-site geologic materials are expected to be in the low to high expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 55 feet below grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Newport–Inglewood Fault, which is located approximately 2.6 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Venice Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xx) FF-33 and FF-34

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Anticipated Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Puente Hills Fault, which is located approximately 0.7 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Inglewood Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(b) Non-Freeway Facing TCN Structures

(i) NFF-1

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be

encountered at depths approximately 20 to 60 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 25 and 40 feet in depth below the existing site grade. The historically highest groundwater level is approximately 30 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.5 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(ii) NFF-2

Geologic Materials

It is anticipated that the geologic materials at this Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The onsite geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 20 and 40 feet in depth below the existing site grade. The historical highest groundwater is 20 feet below grade.

Nearest Fault

The seismic fault nearest to this Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.3 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle (CDMG 1999), indicates that the site is located within a “Liquefiable” area.

(iii) NFF-3

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to low expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 100 feet below the existing site grade. The historically highest groundwater level is approximately 10 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Verdugo Fault, which is located approximately 3.7 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(iv) NFF-4 and NFF-5

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils, which are anticipated to consist of a mixture of sand and silt. Bedrock of the Upper Topanga Formation should be expected under the native alluvial soils. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths greater than 30 feet in depth below the existing site's grade. The historically highest groundwater level is approximately 10 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Hollywood Fault, which is located approximately 2.5 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Burbank Quadrangle indicates that the Site Locations are located within a “Liquefiable” area.

(v) NFF-6

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. Bedrock of the Fernando Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 20 to 40 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths greater than 100 feet below the existing site grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 1.5 miles away.

Liquefaction

California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Location is located within a “Liquefiable” area.

(vi) NFF-7

Geologic Materials

It is anticipated that the geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils, which are anticipated to consist of a mixture of sand, silt and clay. Marine Sediments should be expected to underlie the native alluvial soils, at depths ranging between 30 and 40 feet below the existing grade. The on-site geologic materials are expected to be in the very low to high expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 45 feet below grade. The historically highest groundwater level is approximately 30 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Newport–Inglewood Fault, which is located approximately 0.6 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Beverly Hills Quadrangle indicates that the subject site is not located within a “Liquefiable” area.

(vii) NFF-8

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. Bedrock of the Fernando Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 25 to 40 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet below the existing site grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 1.0 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Location is located within a “Liquefiable” area.

(viii) NFF-9

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below the existing site grade. The historically highest groundwater level is approximately 16 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Verdugo Fault, which is located approximately 5.3 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the Site Location is located within a “Liquefiable” area.

(ix) NFF-10

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt, and clay. The on-site geologic materials are expected to be in the low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below the existing site grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Verdugo Fault, which is located approximately 6.0 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Van Nuys Quadrangle indicates that the Site Location is located within a “Liquefiable” area.

(x) NFF-11

Anticipated Geologic Materials

It is anticipated that the geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the moderate to high expansion range.

Anticipated Groundwater Conditions

Groundwater should be expected at a depth greater than 50 feet below the existing site grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Newport–Inglewood Fault, which is located approximately 0.8 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Inglewood Quadrangle indicates that the subject site is not located within a “Liquefiable” area.

(xi) NFF-12

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. The on-site geologic materials are expected to be in the moderate to high expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 50 feet below the existing site grade. The historically highest groundwater level is approximately 10 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Puente Hills Fault, which is located approximately 0.6 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(xii) NFF-13

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 80 to 120 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet in depth below the existing site grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.8 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the subject site is located within a “Liquefiable” area.

(xiii) NFF-14 and NFF-15

Geologic Materials

The geologic materials at the Site Locations consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to

consist of a mixture of sand, clay and silt. The on-site geologic materials are expected to be in the low to high expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 50 feet below grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Locations corresponds to the Santa Monica Fault, which is located approximately 0.6 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Beverly Hills Quadrangle indicates that the Site Locations are not located within a “Liquefiable” area.

(xiv) NFF-16

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. Bedrock of the Fernando Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 25 to 40 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 30 and 50 feet below the existing site grade. The historically highest groundwater level is approximately 50 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 1.1 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xv) NFF-17

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below the existing site grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Newport–Inglewood Park Fault, which is located approximately 1.5 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Venice Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xvi) NFF-18

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below the existing site grade. The historically highest groundwater level is approximately 40 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Newport–Inglewood Park Fault, which is located approximately 1.8 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Venice Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xvii) NFF-19

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 5 to 20 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater seepage should be expected at depths between 10 and 20 feet in depth below the existing site grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 1.7 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xviii) NFF-20

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand, silt and clay. Bedrock of the Upper Miocene Puente Formation may be encountered underlying the alluvial soils. It is anticipated that the bedrock may be encountered at depths approximately 3 to 20 feet below the ground surface. The on-site geologic materials are expected to be in the very low to moderate expansion range.

Groundwater Conditions

Groundwater should be expected at depths between 10 and 20 feet in depth below the existing site grade. The historically highest groundwater level is approximately 20 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 0.9 mile away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Hollywood Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(xix) NFF-21

Geologic Materials

It is anticipated that the geologic materials at this Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The onsite geologic materials are expected to be in the very low to low expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 60 feet below the existing site grade. The historical highest groundwater level for the site is established by review of the California Geological Survey Seismic Hazard Evaluation Report of the Los Angeles Quadrangle, Plate 1.2 entitled “Historically Highest Ground Water Contours”. Review of this plate indicates that the historically highest groundwater level is on the order of 100 feet below grade.

Nearest Fault

The seismic fault nearest to this site location corresponds to the Upper Elysian Park Fault, which is located approximately 1.8 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle, indicates that the site is not located within an area susceptible to liquefaction,

or potential impacts related to liquefaction, such as lateral spreading and surface manifestation.

(xx) NFF-22

Geologic Materials

The geologic materials at the Site Location consist of a limited amount of fill materials, underlain by native alluvial soils. The native alluvial soils are anticipated to consist of a mixture of sand and silt. The on-site geologic materials are expected to be in the very low to low expansion range.

Groundwater Conditions

Groundwater should be expected at a depth greater than 100 feet below the existing site grade. The historically highest groundwater level is approximately 150 feet below grade.

Nearest Fault

The seismic fault nearest to the Site Location corresponds to the Upper Elysian Park Fault, which is located approximately 2.2 miles away.

Liquefaction

Review of the California Seismic Hazards Zones Map for the Los Angeles Quadrangle indicates that the Site Location is not located within a “Liquefiable” area.

(6) Paleontological Resources

Paleontology is the study of fossils, which are the remains of ancient life forms. As part of the Geology and Soils Evaluation, Geotechnologies, Inc., reviewed published Geologic Maps, which show the distribution of the geologic materials anticipated in the general vicinity of the Site Locations. As described above, the Site Locations are mapped as being underlain by a variety of geologic materials. All Site Locations are anticipated to include at least a limited amount of fill materials, underlain by native alluvial soils. Depending on the Site Location, the native alluvial soils are anticipated to consist of a mixture of sand and silt or sand, silt, and clay. Additionally, at several Site Locations, bedrock may be encountered underlying the alluvial soils at various depths. The type of bedrock that may be encountered varies with the Site Location and includes the Upper Miocene Puente Formation, the Upper Topanga Formation, Marine Sediments, and the Fernando Formation. Overall, due to the depth of grading for most Site Locations, it is

possible that fossilized remains may be encountered during grading operations within the Site Locations, particularly where bedrock is likely to be encountered.

3. Project Impacts

a. Thresholds of Significance

(1) Construction

In accordance with Appendix G of the CEQA Guidelines and the *California Building Industry Association v. Bay Area Air Quality Management District* decision, a project would have a significant impact related to geology and soils if it would result in any of the following impacts:[7]

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 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.

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[7] *In 2015, the California Supreme Court, in California Building Industry Assn. v. Bay Area Air Quality Management Dist. (2015) 62 Cal.4th 369, held that CEQA generally does not require a lead agency to consider the impacts of the existing environment on the future residents or users of the project. The revised thresholds are intended to comply with this decision. Specially, the decision held that an impact from the existing environment to the project, including future users and/or residents, is not an impact for the purposes of CEQA. However, if the project, including future users and residents, exacerbates existing conditions that already exist, that impact must be assessed, including how it might affect future users and/or residents of the project.*

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

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 waste water.

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

For this analysis, the Appendix G Thresholds listed above are relied upon.

b. Methodology

Geotechnologies, Inc. has performed previous geotechnical engineering investigations (GEI) for sites located in the vicinity of the proposed TCN Structures. These investigations have been reviewed in order to provide anticipated subsurface conditions for each Site Location. The investigations are listed in detail in the Geology and Soils Evaluation. Geotechnologies, Inc., also reviewed published Geologic Maps, which show the distribution of the geologic materials anticipated in the general vicinity of the Site Locations; Historically Highest Groundwater Level Maps, which show the mapped highest groundwater depth anticipated in the vicinity of the Site Locations; Seismic Hazards Zone Maps which show the potentially liquefiable areas relative to the Site Locations; and Earthquake Zones of Required Investigation Maps, which show the Earthquake Fault Zone of Required Investigation relative to Site Locations.[8] These maps are appended to the Geology and Soils Evaluation.

c. Project Design Features

The following Project design feature is proposed with regard to geology and soils:

Project Design Feature GEO-PDF-1: All development activities conducted on the Site Locations will incorporate the professional recommendations contained in the Geology and Soils Evaluation and associated recommendations set forth in a site location-specific, design-level geologic and geotechnical investigation(s) approved by the Metro Capital Engineering Group and/or the Los Angeles Department of

[8] *Due to differing methodologies utilized between consultants, the estimated depth to groundwater described in this section may slightly differ from that described in Section IV.H, Hazards and Hazardous Materials, of this Draft EIR. Such differences do not affect the conclusions in either section.*

Building and Safety (LADBS), provided such recommendations meet and/or surpass relevant state and City laws, ordinances, Code requirements, and MRDC requirements, California Geological Survey's Special Publication 117A and the City's Building Code, as applicable. Such professional recommendations include site-specific subsurface exploration and laboratory testing, foundation systems that are specific to the geologic materials encountered at each individual site, and prohibition of the use of fill materials to support foundation systems.

d. Analysis of Project Impacts

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 Special Publication 42.

(1) Impact Analysis

As discussed above, ground rupture is the visible breaking and displacement of the earth's surface along the trace of a fault during an earthquake. Based on the Geology and Soils Evaluation, no known active or potentially active faults underlie the Site Locations. In addition, the Site Locations are not located within a state-designated Alquist-Priolo Earthquake Fault Zone. The nearest fault varies with the Site Location and includes the Upper Elysian Park Fault, the Hollywood Fault, the Puente Hills Fault, the Verdugo Fault, the Santa Susana Fault, the Santa Monica Fault, and the Newport–Inglewood Fault System at distances that range between 0.25 mile and 6 miles. As such, the potential for surface rupture due to faulting occurring beneath the Site Locations is considered low. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **Thus, the Project would not directly or indirectly cause or exacerbate potential substantial adverse effects, including the risk of loss, injury, or death related to fault rupture. Impacts associated with surface rupture from a known earthquake fault would be less than significant.**

(2) Mitigation Measures

Project-level impacts related to rupture of a known earthquake fault would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to rupture of a known earthquake fault 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): 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

As described above, the Site Locations are located within the seismically active region of Southern California and would potentially be subject to strong seismic ground shaking if a moderate to strong earthquake occurs on a local or regional fault. However, State and local code requirements, as discussed above in the Regulatory Framework, ensure that structures are designed and constructed in a manner that, although the structures may sustain damage during a major earthquake, would reduce the risk that structures would collapse. Specifically, the State, Metro, and City mandate compliance with numerous rules related to seismic safety, including the Alquist-Priolo Earthquake Fault Zoning Act, Seismic Safety Act, Seismic Hazards Mapping Act, the California Building Code, MRDC, the City's General Plan Safety Element, and the Los Angeles Building Code. Pursuant to those laws, the Project must demonstrate compliance with the applicable provisions of these safety requirements to minimize seismic impacts before permits can be issued for construction of the Project. In addition, in accordance with Project Design Feature GEO-PDF-1, the Project would implement Project-specific geotechnical design recommendations set forth in the Geology and Soils Evaluation included as Appendix G of this Draft EIR as well as site-specific recommendations set forth in design level documents. These recommendations would be enforced by Metro Capital Engineering Group and/or LADBS for the construction of the Project.

The Project is typical of urban environments and would not involve mining operations, deep excavation into the earth, or boring of large areas creating unstable seismic conditions or stresses in the earth's crust. Furthermore, as discussed above, there are no known active or potentially active faults that underlie the Project Site. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. Accordingly, the Project would not exacerbate seismic conditions or other geologic conditions on the Project Site or vicinity. **Through compliance with regulatory requirements and site-specific geotechnical recommendations contained in a final design-level geotechnical engineering report, the Project would not directly or indirectly cause or exacerbate potential substantial adverse effects, including the**

risk of loss, injury, or death related to strong seismic ground shaking. Thus, impacts related to strong seismic ground shaking would be less than significant.

(2) Mitigation Measures

Project-level impacts related to strong seismic ground shaking would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to 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): 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

The Project does not include structures that would be occupied. However, as discussed above, many of the Site Locations for the TCN Structures have been mapped as susceptible to liquefaction. As such, in accordance with Project Design Feature GEO-PDF-1, site-specific liquefaction analyses would be required in order to determine if the site soils would be susceptible to liquefaction during the design-based seismic event, which is the event a structure is designed to withstand without collapsing. If the site-specific liquefaction analyses confirm the site soils are susceptible to liquefaction, the Geology and Soils Evaluation recommends that the proposed TCN Structures be supported by a deep foundation system, consisting of caissons or piles. Additionally, the Project would be designed in accordance with the MRDC and Los Angeles Building Code, which requires implementation of engineering techniques to minimize hazards related to ground failure, including liquefaction, to acceptable levels. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. As such, the Project would not exacerbate existing environmental conditions or cause or accelerate geologic hazards related to liquefaction. **Therefore, the Project would not directly or indirectly cause or exacerbate potential substantial adverse effects, including the risk of loss, injury, or death related to seismic-related ground failure, including liquefaction. Impacts associated with seismic-related ground failure, including liquefaction, would be less than significant.**

(2) Mitigation Measures

Project-level impacts related to seismic-related ground failure would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to 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.

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

iv. Landslides.

(1) Impact Analysis

As summarized above and discussed in detail in the Geology and Soils Evaluation, the Site Locations are not located in a landslide area. Furthermore, The Project does not include any structures that would be occupied. In addition, the Project would not alter exposed soils on a hill, nor inject water into the soil upslope that could cause a landslide downhill. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **Therefore, the Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death related to landslides. As such, no impacts with respect to landslides would occur. No further analysis is required**.

(2) Mitigation Measures

Project-level impacts related to landslides would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to landslides 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 (b): Result in substantial soil erosion or the loss of topsoil.

(1) Impact Analysis

The TCN Structures would be constructed with the use of a drill rig that would drill a hole up to 50 feet in depth on an approximately 10-foot by 10-foot area, depending on soil conditions and size of the digital display. As such, grading activities and potential soil erosion and loss of topsoil would be limited. In addition, all grading activities would require review and approval of a final site-specific geotechnical report by the Metro Capital Engineering Group and/or LADBS, which would include requirements and standards designed to ensure that substantial soil erosion does not occur. Furthermore, on-site grading and site preparation would comply with all applicable provisions of LAMC Chapter IX, Article 1, which addresses grading, excavations, and fills. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **Therefore, with compliance with regulatory requirements, the Project would not result in substantial soil erosion or the loss of topsoil. As such, impacts with respect to Threshold (b) would be less than significant.**

(2) Mitigation Measures

Project-level impacts related to soil erosion or the loss of topsoil would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to soil erosion or the loss of topsoil 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 (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.

(1) Impact Analysis

As previously discussed, the Site Locations are not located in a landslide area as mapped by the City. In addition, ground disturbance associated with the removal of static displays would be temporary and minimal. **Therefore, no impacts related to landslides would occur.**

As previously noted, liquefaction-related effects include lateral spreading. The Geology and Soils Evaluation concluded that several Site Locations are located in areas susceptible to liquefaction. Therefore, the Site Locations are also susceptible to lateral spreading. As such, in accordance with Project Design Feature GEO-PDF-1, site-specific

liquefaction analyses would be required in order to determine if the site soils would be susceptible to liquefaction, and therefore lateral spreading, during the design-based seismic event. If the site-specific liquefaction analyses confirm the site soils are susceptible to liquefaction, the Geology and Soils Evaluation recommends that the proposed TCN Structures are supported by a deep foundation system, consisting of caissons or piles. Additionally, the Project would be designed in accordance with the requirements of the MRDC and Los Angeles Building Code, which requires implementation of engineering techniques to minimize hazards related to ground failure, including liquefaction, to acceptable levels. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **As such, the Project would not be located on or exacerbate a geologic unit or soil that is unstable, which could potentially result in liquefaction and lateral spreading. Impacts related to liquefaction and lateral spreading would be less than significant, and no mitigation measures are required.**

With respect to subsidence, as previously discussed, no large-scale extraction of groundwater, gas, oil, or geothermal energy currently occurs or is planned at the Site Locations. Therefore, the potential for ground subsidence due to the withdrawal of fluid or gas at the Site Locations are low. Project excavations for placement of the TCN Structures would extend to a maximum depth of approximately 50 feet. As discussed in the Geology and Soils Evaluation, the historic high groundwater levels vary according to the location of each TCN Structure and may be as shallow as 5 feet below ground surface. Although dewatering operations may be required during construction, such activities would be limited and temporary and would not involve large-scale water extraction. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **As such, the Project would not be located on or exacerbate a geologic unit or soil that is unstable, which could potentially result in subsidence. Impacts related to subsidence would be less than significant.**

According to the Geology and Soils Evaluation, the fill soil composition and depth that underlie the proposed TCN Structures vary by Site Location. As discussed in the Geology and Soils Evaluation, the proposed TCN Structures would be supported by foundation systems according to the soil type, with deep foundation systems, consisting of caissons or piles, potentially necessary at certain sites. Depending on the geologic materials encountered at each individual site, the foundation system may derive its bearing capacity from native alluvial soils, and/or bedrock. Fill materials are not considered suitable for support of the recommended foundation system and would not be used. These recommendations would be incorporated in accordance with Project Design Feature GEO-PDF-1. In addition, the Project would be required to provide a final, site-specific geotechnical report that would include the preliminary recommendations from the Geology and Soils Evaluation as well as final recommendations that would be enforced by the Metro Capital Engineering Group and/or LADBS. Lastly, ground disturbance associated with the

removal of static displays would be temporary and minimal. **As such, the Project would not be located on or exacerbate a geologic unit or soil that is unstable or that would become unstable as a result of the Project and potentially result in collapse. Impacts associated with collapsible soils would be less than significant.**

(2) Mitigation Measures

Project-level impacts related to soil erosion or the loss of topsoil would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to an unstable geologic unit or unstable soil 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 (d): Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.

(1) Impact Analysis

As discussed in the Geology and Soils Evaluation, the on-site geologic materials at the Site Locations are in the low to high expansion range. Per Project Design Feature GEO-PDF-1, it is anticipated that where structurally necessary, the proposed TCN Structures would be supported by a deep foundation system, consisting of caissons or piles. Depending on the geologic materials encountered at each individual site, the foundation system may derive its bearing capacity from native alluvial soils, and/or bedrock. Fill materials are not considered suitable for support of the recommended foundation system and would not be used. Lastly, ground disturbance associated with the removal of static displays would be temporary and minimal. **With implementation of Project Design Feature GEO-PDF-1, potential impacts with regard to expansive soil would be less than significant.**

(2) Mitigation Measures

Project-level impacts related to expansive soil would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Project-level impacts related to expansive soil 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 (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 waste water.

As discussed in Section VI, Other CEQA Considerations, of this Draft EIR, and evaluated in the Initial Study prepared for the Project, included in Appendix A of this Draft EIR, the Project would not require the disposal of wastewater and therefore, would not require the use of septic tanks or alternative wastewater disposal systems. Thus, the Project would have no impact related to the ability of soils to support septic tanks or alternative wastewater disposal systems. **Therefore, as determined in the Initial Study, the Project would not result in impacts related to the ability of soils to support septic tanks or alternative wastewater disposal systems. Therefore, no impacts with respect to Threshold (e) would occur. No further analysis is required.**

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

(1) Impact Analysis

Ground disturbance associated with the removal of static displays would be temporary and minimal. In addition, as previously discussed, the Geology and Soils Report included a review of Geologic Maps, which show the distribution of the geologic materials anticipated in the general vicinity of the proposed TCN Structures. The Site Locations are mapped as being underlain by a variety of geologic materials depending on the Site Location. All Site Locations are anticipated to include at least a limited amount of fill materials, underlain by native alluvial soils. Depending on the Site Location, the native alluvial soils are anticipated to consist of a mixture of sand and silt or sand, silt, and clay. Additionally, while all of the Site Locations have been previously disturbed, at several Site Locations, bedrock may be encountered underlying the alluvial soils at various depths. The type of bedrock that may be encountered varies with the Site Location and includes the Upper Miocene Puente Formation, the Upper Topanga Formation, Marine Sediments, and the Fernando Formation. Previously undisturbed soils at the Site Locations could be conducive to preserving vertebrate fossils. The Project would include excavations up to a maximum of approximately 50 feet below grade. Therefore, it is possible that paleontological resources may be encountered during grading and drilling operations within

the Site Locations. **Therefore, potential impacts to unique paleontological resources would be potentially significant.**

With regard to unique geologic features, there are no unique geologic features at the Site Locations. Additionally, ground disturbance associated with the removal of static displays would be temporary and minimal. **Therefore, as determined in the Initial Study, the Project would not directly or indirectly destroy a unique geologic feature. No impact with respect to the destruction of a unique geologic feature would occur, and no further analysis is required.**

(2) Mitigation Measures

The following mitigation measure is provided to reduce impacts to paleontological resources:

Mitigation Measure GEO-MM-1: The services of a Project paleontologist who meets the Society of Vertebrate Paleontology standards (including a graduate degree in paleontology or geology and/or a publication record in peer reviewed journals, with demonstrated competence in the paleontology of California or related topical or geographic areas, and at least two full years of experience as assistant to a Project paleontologist), shall be retained prior to ground disturbance activities associated with Project construction in order to develop a site-specific Paleontological Resource Mitigation and Treatment Plan. The Paleontological Resource Mitigation and Treatment Plan shall specify the levels and types of mitigation efforts based on the types and depths of ground disturbance activities and the geologic and paleontological sensitivity of the Site Locations. The Paleontological Resource Mitigation and Treatment Plan shall also include a description of the professional qualifications required of key staff, communication protocols during construction, fossil recovery protocols, sampling protocols for microfossils, laboratory procedures, reporting requirements, and curation provisions for any collected fossil specimens.

(3) Level of Significance After Mitigation

To address potential impacts to paleontological resources, the Project would develop a site-specific Paleontological Resource Mitigation and Treatment Plan. The Paleontological Resource Mitigation and Treatment Plan would follow the guidelines outlined by the Society of Vertebrate Paleontology and include sediment sampling protocols for microfossil recovery. **With the implementation of Mitigation Measure GEO-MM-1, Project-level impacts to unique paleontological resources would be reduced to a less than significant level.**

e. Cumulative Impacts

(1) Impact Analysis

Due to the site-specific nature of geological conditions (i.e., soils, geological features, subsurface features, seismic features, etc.), geological impacts are typically assessed on a project-by-project basis, rather than on a cumulative basis. Nonetheless, cumulative growth in the surrounding area through 2025, the Project's anticipated buildout year, would expose a greater number of people to seismic hazards. However, as with the Project, related projects and other future development projects described in Section III. Environmental Setting, of this Draft EIR, would be subject to established guidelines and regulations pertaining to building design and seismic safety, including those set forth in MRDC, the California Building Code, and Los Angeles Building Code, as applicable, as well as site-specific geotechnical evaluations that would identify potential effects related to the underlying geologic and soil conditions for a particular related Project Site. **With adherence to applicable regulations and any site-specific recommendations set forth in a site-specific geotechnical evaluation, the Project and related projects would not result in significant cumulative impacts related to geological and soil conditions. As such, the Project's contribution would not be cumulatively considerable, and cumulative impacts would be less than significant.**

With regard to potential cumulative impacts related to paleontological resources, ground disturbance associated with the removal of static displays would be temporary and minimal. In addition, the Site Locations for the TCN Structures are located within urbanized areas that have been disturbed and developed over time. Nonetheless, based on the geologic formations below the Site Locations, the potential for uncovering paleontological resources exists. Like the Project, as part of the environmental review processes for the related projects, it is expected that mitigation measures would be established as necessary to address potential impacts to paleontological resources. **Therefore, the Project and related projects would not result in significant cumulative impacts to paleontological resources. As such, the Project's contribution would not be cumulatively considerable, and cumulative impacts would be less than significant.**

(2) Mitigation Measures

Cumulative impacts related to geology and soils and paleontological resources would be less than significant. Therefore, no mitigation measures are required.

(3) Level of Significance After Mitigation

Cumulative impacts related to geology and soils and paleontological resources 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.