4.6.1 INTRODUCTION

This section of the Recirculated Draft Environmental Impact Report (Recirculated Draft EIR) evaluates the impacts of the proposed Inglewood Transit Connector Project (proposed Project or ITC Project) related to seismicity and paleontological resources.[1] Information from the following reports is incorporated into this section:

- *Fault Rupture Hazard Evaluation in Support of Draft EIR (Fault Rupture Hazard Evaluation)*, Geosyntec Consultants, September 27, 2019 (**Appendix K.1: Fault Rupture Study**);
- *Development of Seismic Design Criteria in Support of Draft EIR (Seismic Design Criteria)*, Geosyntec Consultants, June 26, 2019 (**Appendix K.2: Seismic Design Criteria**); and
- *Inglewood Transit Connector, Technical Memorandum, Geology and Soils,* Geosyntec Consultants, June 25, 2018 (**Appendix K.3: Technical Memorandum, Geology and Soils**).

Prior to the preparation of the December 2020 Draft EIR, a Revised Initial Study (included in **Appendix A.2**), was prepared using the California Environmental Quality Act (CEQA) Environmental Checklist to assess potential environmental impacts associated with geology and soils. Four screening thresholds were found to result in "Less than Significant Impacts," and two thresholds would result in "No Impact." Thus, these topics are not analyzed further in this Recirculated Draft EIR:

- Impacts related to the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction, were evaluated, and determined to be less than significant. The location of the proposed Project is not within an area known to be susceptible to liquefaction.[2]
- Impacts related to the exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, were evaluated, and determined to have no impact. The location of the proposed Project is not within a designated earthquake-induced landslide zone known to the California Geological Survey (CGS). Further, the lack of general elevation difference in the area would limit the risk of seismically induced landslides occurring, nor does the proposed Project substantially alter the existing topography of the area.[3]
- Impacts related to substantial soil erosion or the loss of topsoil were evaluated and determined to be less than significant. The proposed Project shall be subject to a Storm Water Pollution Prevention Plan

1 Paleontological Resources Assessment Report, Inglewood Basketball and Entertainment Center, City of Inglewood, California, ESA, May 2019.
2 Inglewood Transit Connector*, Technical Memorandum,* Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.
3 Inglewood Transit Connector, *Technical Memorandum,* Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.

(SWPPP) in accordance with the National Pollutant Discharge Elimination System (NPDES). Compliance with construction-related best management practices (BMPs), as detailed in the SWPPP, would control, and minimize erosion and siltation.[4]

- Impacts related to location 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 were evaluated and determined to be less than significant. United State Geological Survey (USGS) groundwater data note that groundwater is at least 85 feet below ground surface. Dewatering, an activity that contributes to subsidence and ground collapse, would not be necessary for the proposed Project. The proposed Project design and construction would be required to adhere to all applicable building codes and standards ensuring that impacts related to geological failure—including lateral spreading, off-site landslides, liquefaction, or collapse would be less than significant.[5]
- Impacts related to location on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property were evaluated and determined to be less than significant. The proposed Project's design and construction would incorporate construction practices to maintain the integrity of building and support structures and would comply with all applicable building codes and standards.[6]
- No impacts would result from soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. The proposed Project would connect to the City's existing sewer system and would not require the use of septic tanks or alternative wastewater disposal systems.[7]

After circulation of the December 2020 Draft EIR for public review, the City revised the design of the Project in response consultation with key stakeholders in the community and comments received on the December 2020 Draft EIR. Specific changes to the proposed Project include raising the height of the ATS guideway along Market Street to preserve existing views of historic buildings, relocating the Prairie Avenue/Pincay Drive Station to the southwest corner of Prairie Avenue and Manchester Boulevard, redesign of the proposed MSF to allow this facility to be located on the proposed site with a new Vons store, and realignment of the guideway and stations on Prairie Avenue to the west side of Prairie Avenue. As it relates to impacts to geology and soils, impacts would remain less than significant with mitigation similar to the December 2020 Draft EIR.

4 Inglewood Transit Connector, *Technical Memorandum*, Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.
5 Inglewood Transit Connector, *Technical Memorandum,* Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.
6 Inglewood Transit Connector, *Technical Memorandum*, Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.
7 Inglewood Transit Connector, *Technical Memorandum,* Geology and Soils, Geosyntec Consultants, June 25, 2018. See **Appendix K.3**.

These changes to the design of the Project do not create the potential for significant impacts related to liquefaction, seismically induced landslides, erosion and/or loss of topsoil. These changes also do not create the potential for significant impacts related to geologic failure including lateral spreading, off-site landslides, or collapse, as described above. The revised Project would not be located on expansive soils, nor would it require alternative wastewater disposal systems.

Impacts found to be less than significant are further discussed in **Section 6.0: Other Environmental Considerations**.

4.6.2 METHODOLOGY

The evaluation of potentially significant impacts related to seismicity as a result of the proposed Project is based on a review of existing conditions and a review of geotechnical reports prepared for the proposed Project. To ascertain the existing conditions, published USGS geological maps were reviewed, and geologic and geotechnical records were obtained from publicly available online resources, including municipalities and agencies with jurisdiction near the Project area including Los Angeles County Department of Public Works, LA Metro, Caltrans, and City of Inglewood (City) Building and Safety Division. Various database searches were performed using USGS and CGS to compile available documents and incorporate relevant information into this assessment. No site reconnaissance, geologic mapping, subsurface, or site-specific investigations were performed.

The evaluation of the potential for paleontological resources to be located within the Project alignment and impacts to these resources is based on a paleontological report prepared for a project in the vicinity of the proposed Project area.[8]

Existing seismic conditions and paleontological resources near the Project are described, and the regulatory framework that guides the evaluation of the proposed Project are provided. Direct and/or indirect Project impacts that would result from Project implementation are then identified, along with any measures to mitigate potentially significant impacts, as necessary.

4.6.3 REGULATORY FRAMEWORK

Federal, State, and local laws, regulations, and policies pertaining to geology and soils provide the regulatory framework for addressing aspects of seismic and geotechnical conditions that would be affected by development of the proposed Project. The following is a summary of key applicable regulations related to potential seismic and geotechnical conditions.

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8 DEIR Appendix I: Paleontological Resources Report*, Inglewood Basketball and Entertainment Center Project*, December 2019, http://ibecproject.com/I_PaleontologicalResourcesReport.pdf.

4.6.3.1 Federal Regulations

Earthquake Hazards Reduction Act

The U.S. Congress passed the Earthquake Hazards Reduction Act in 1977[9] 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 reduction program.

To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP);[10] this program was substantially amended in November 1990 by the NEHRPA,[11] which refined the description of agency responsibilities, program goals, and objectives. Focusing on research, building code standards, technical guidance, and education, NEHRP is a collaborative effort among the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the USGS.

4.6.3.2 State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to identify hazards associated with surface fault ruptures and to prevent the construction of buildings on active faults.[12] Alquist-Priolo earthquake fault zones (APEFZ) are regulatory zones surrounding the surface traces of active faults in California. Wherever an active fault exists, if it has the potential for surface rupture, a structure for human occupancy cannot be placed over the fault and must be a minimum distance from the fault, generally fifty feet. Earthquake fault zones were conceived in the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act). The intent of the Alquist-Priolo Act is to reduce property and life losses from surface fault rupture.

The State Geologist is required to establish and map zones around the surface traces of active faults, which are then distributed to county and city agencies to be incorporated into their land use planning and construction policies. Proposed development needs to be proven through geologic investigation to not be located across active faults before a city or county can permit the implementation of projects. If an active fault is found, development for human occupancy is prohibited within a 50-foot setback, or a distance demonstrated to be appropriate by the geologic investigation, from the identified fault.

9 National Earthquake Hazards Reduction Program Reauthorization Act of 2004, Public Law 95-124, 42 U.S.C. 7701 et. seq.), as amended by Public Laws 101-614, 105-47, 106-503, and 108-360.

10 Earthquake Hazards Reduction Act of 1977, As Amended by Section 5. Earthquake Hazards Reduction Program [New Section 103 in Public Law 108-360]

11 Earthquake Hazards Reduction Program Reauthorization Act of 1990 (P.L. 101-614)

12 California State Alquist-Priolo Earthquake Fault Zoning Act of 1972. California Public Resources Code, sec. 2621.5.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act is a State law that requires delineated maps to be created by the California State Geologist to reflect where potential ground shaking, liquefaction, or earthquake-induced landslides may occur.[13] The purpose of the Seismic Hazards Mapping Act is to protect the public from the effects of nonsurface fault rupture earthquake hazards, inducing strong ground shaking, liquefaction, seismically induced landslides, or other ground failure caused by earthquakes. City, County, and State agencies are required to use seismic hazard maps in their land use decision making. Projects within seismic hazard zones are required to have site-specific geotechnical investigations and incorporate appropriate mitigation measures identified as a result. The State has published guidelines for evaluating and mitigating seismic hazards.[14]

California Building Code, California Code of Regulations

The 2019 California Building Code (CBC) was published July 1, 2019, with an effective date of January 1, 2020. It is administered by the California Building Standards Commission (CBSC).[15] The CBC governs all development within the State of California, as amended and adopted by each local jurisdiction. These regulations include provisions for site work, demolition, and construction, which include excavation and grading, as well as provisions for foundations, retaining walls, and expansive and compressible soils. The CBC provides guidelines for building design to protect occupants from seismic hazards.

California Department of Transportation (Caltrans)

The California Department of Transportation (Caltrans) Division of Engineering Services (DES) is the lead project delivery organization for the design, construction, and oversight of bridge and other transportation structures. DES is a comprehensive, multidisciplinary engineering organization committed to providing quality products and services in a timely manner. DES has prepared numerous guidance documents for use in the design and construction of bridges and structures to address geologic conditions. These guidance documents include the two Memorandums (Memos) to Designers, described below, applicable to the design of the proposed Project. These memos define the factors to be addressed in fault investigations completed as part of the structural design process.

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13 California Public Resources Code, sec. 2690–2699.6 Seismic Hazards Mapping Act.

14 California Division of Mines and Geology Special Publication 117, 1997; revised and readopted in 2008 by the California Geologic Survey.

15 2019 California Building Standards Code (Cal. Code Regs., Title 24) published July 1, 2019.

Caltrans Memo to Designers 20-8 (Analysis of Ordinary Bridges that Cross Faults)

Caltrans Memo to Designers 20-8 (Analysis of Ordinary Bridges that Cross Faults) dated January 2013, provides specific guidance for the design of bridges that cross active earthquake faults.[16]

Memo to Designers (MTD) 20-8 states that although a few exceptions exist, the fault rupture hazard is only required for Holocene faults[17] identified by the California Geologic Survey in APEFZ maps.

The memo states that when a bridge or similar structure crosses a fault that falls within a mapped APEFZ, the design is to take into account the displacement demand resulting from a fault offset, dynamic response due to ground shaking, and any other fault-induced hazards, such as creep, which may occur. MTD 20-8 defines a method for determining the potential displacement at columns and abutments at fault crossings to support designing structures to respond to these conditions.

Caltrans Memo to Designers 20-10 (Fault Rupture)

Caltrans Memo to Designers 20-10 (Fault Rupture),[18] dated January 2013, provides guidance for the design of bridge type structures to address the potential fault rupture where any portion of a structure falls within an APEFZ, where any portion of a structure falls within 330 feet of well-mapped active faults, or within 1,000 feet of a fault not located in an APEFZ may require further study.[19]

This memo identifies changes to design required for bridges and similar structures when crossing a fault to address potential fault rupture effects. MTD 20-10 supplements the defined method described in MTD 20-08 above for determining the potential displacement at columns and abutments at fault crossings and designing the structures so to slide at the abutment, bent, or hinge seats points without failing.

Public Resources Code Section 5097.5 and Section 30244

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value that are afforded protection under state laws and regulations. The following section summarizes the applicable federal and state laws and regulations, as well as professional standards provided by the Society of Vertebrate Paleontology (SVP).

PRC Section 5097.5 and Section 30244 include state requirements for paleontological resource management. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as

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16 Caltrans LRFD, Memo to Designers 20-8, Analysis of Ordinary Bridges that Cross Faults, January 2018.
17 Holocene faults are less than 10,000 years old.
18 Caltrans LRFD, Memo to Designers 20-10, Fault rupture, January 2013.
19 In such instances, the memo states that if further study of the fault rupture is needed, then procedures as outlined in CGS Note 49 shall be followed. https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-49.pdf.

a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (State, county, city, district) lands.

4.6.3.3 Local Regulations

City of Inglewood General Plan Safety Element

The General Plan Safety Element[20] is designed to ensure that the citizens of Inglewood can be protected from unreasonable risks caused by natural and manmade disasters. The City's goals are to minimize the dangers associated with natural and manmade hazards by implementing standards, regulations and laws that would reduce loss of life, injuries and property damage resulting from disasters, and to provide for the continuity of government operations and civilian life during and after a major disaster.

It is a general policy of the City to provide appropriate services and support to combat any disasters, and to protect the citizenry from significant adverse impacts arising from any disasters. Policies of the City's General Plan "Safety Element"[21] applicable to geology, soils, and seismicity include the following:

Policy 1 **Provide measures to reduce seismic impact.**

- Ensure that all potentially hazardous buildings are reinforced or demolished.
- Restrict new structures for human occupancy from being constructed across active faults.
- Require geological and soils engineering investigations in high risk fault areas.
- Use the latest State-approved edition of the Uniform Building Code and other applicable seismic design information.
- Periodically review subdivision requirements and other codes to improve requirements for safety and seismic safety as new information becomes available.
- Study the need for a seismic overlay zone to restrict certain types of development.
- Require a soils report for new buildings, as well as obtaining or utilizing, when available, geologic drillings or studies, local ground subsidence and elevation studies, geologic-seismic studies, strong motion monitoring, gathering, compiling, and interpreting local and regional geologic seismic data as it becomes available.
- Maintain the tagging system used to identify buildings damaged in an earthquake.
- Ensure that the Centinela Adobe historic site and any historical sites identified in the future be seismically reinforced.

20 *City of Inglewood General Plan,* "Safety Element" (1995).
21 *City of Inglewood General Plan, "*Safety Element" (1995).

City of Inglewood Municipal Code

Municipal Code Chapter 11, Article 2 Building Code.

The Inglewood Municipal Code[22] has incorporated the most up to date California Building Code in Chapter 11, Sections 11-2 to 11-5. These include ordinances referencing applicable standards and documentation requirements found in the California Building Code that address seismic safety and include the California Building Code, 2019 Edition, Volumes 1 and 2, based on the International Building Code, 2018 Edition, including the Appendix Chapters B, H, I, J and L, "Uniform Housing Code, 1997 Edition," and the "Uniform Code for the Abatement of Dangerous Buildings, 1997 Edition.

Municipal Code Chapter 11, Article 13 Earthquake Hazard Reduction in Existing Buildings

This section of the City's Municipal Code Chapter 11, Sections 11-130 to 11-138[23] promotes public safety and welfare by reducing the risk of death or injury that may result from the effects of earthquakes on unreinforced masonry-bearing-wall buildings constructed prior to 1934, or any unreinforced masonry building located in the City. The municipal code sets forth the minimum standards for structural seismic resistance established primarily to reduce the risk of life loss or injury and provides systematic procedures and standards or identification and classification of unreinforced masonry- bearing- wall buildings based on their present use. Priorities, time periods and standards are also established under which these buildings are required to be structurally analyzed and anchored. Where the analysis finds deficiencies, this code requires the building to be strengthened or demolished. In addition, qualified historical buildings are required to comply with the State Historical Building Code.[24]

4.6.4 EXISTING CONDITIONS

4.6.4.1 Regional Geology

The proposed Project is located within the central portion of the Los Angeles Basin, south of the Santa Monica Mountains, near the intersection of the Peninsular Ranges and Transverse Ranges geomorphic provinces of southern California. The Peninsular Ranges province is characterized by a series of northwest trending mountains and valleys separated by faults associated with, and subparallel to, the San Andreas Fault system. These rocks were intruded by Cretaceous-age (65 million years ago [mya]) granitic basement rocks, also known as the Peninsular Ranges Batholith. The Transverse Ranges are characterized by east-west trending structural features such as the Santa Monica Mountains and the Santa Monica and

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22 City of Inglewood, *Municipal Code,* "Chapter 11, Article 2 Building Code, Sections 11-2 through 11-5. California Building Code. Established and Additions, Deletions and Amendments."

23 City of Inglewood, *Municipal Code*, "Chapter 11, Article 13 Earthquake Hazard Reduction in Existing Buildings, Sections 11-130 to 11-138."

24 California Administrative Code, State Historical Building Code per Part 8, Title 4.

Hollywood faults. The Santa Monica and Hollywood faults are considered the boundary between these two physiographic provinces (the Peninsular Range province and Transverse Range province).

The Los Angeles Basin is a northwest-trending alluviated lowland plain filled with thick deposits of relatively unconsolidated marine and nonmarine sediments bounded by the Santa Monica Mountains to the north; the Elysian, Repetto and Puente Hills to the east; the Santa Ana Mountains and San Joaquin Hills to the south and southeast; and the Pacific Ocean to the west. The relatively flat surface of the Los Angeles Basin slopes gently south and is interrupted by locally trending northwest alignment of low hills and mesas to the south and west that extend from Newport Beach northwest to Beverly Hills, and the Palos Verdes Peninsula at the southwest extremity.

The Los Angeles Basin began forming during the Late Miocene (approximately 7.2 mya) as a result of subsidence following compressional stresses between the right-oblique Whittier and Palos Verdes fault zones, and the left-oblique Santa Monica fault system. Sedimentary deposits within the Los Angeles Basin are estimated to range in thickness from approximately 32,000 feet to 35,000 feet within the general vicinity of the proposed Project.

Subsurface Conditions

Previous geotechnical investigations within the vicinity of the proposed Project were reviewed. These explorations along with published geologic maps indicate that recent Pleistocene-age alluvium forms the surficial cover within the vicinity, often with thin localized layers of artificial fill associated with previous development activities. The anticipated geologic materials in the Project area are described in the following sections.

Artificial Fill

Artificial fill was encountered during previous investigations within the vicinity of the proposed Project extending up to 2 feet below ground surface (bgs) and generally consisted of brown to dark brown sandy silt, characterized as slightly moist and soft to medium stiff. Potential fill underlying the Project alignment is likely the result of grading or construction activities associated with previous development and may vary in composition and thickness.

Alluvial Fan Deposits

Geologic maps of the area describe relatively small portions of the area as underlain by late Pleistocene-age alluvial fan sediments of granitic sand. These alluvial fan deposits (Qae) typically consist of unconsolidated to weakly consolidated sands, silts, clays, and/or mixtures thereof (sandy silts, silty sands, etc.). These materials are generally derived from material shed off the nearby Santa Monica Mountains. The thickness of the alluvial fan deposits is likely variable in the Project alignment.

Older Alluvium

Most of the Project area is underlain by relatively older late Pleistocene-age alluvium (Qoa). The older alluvial deposits consist of sediments that were mainly shed from the Santa Monica Mountains to the north. Composition of the older alluvial deposits primarily consists of slightly consolidated deposits of silts, clays, sands, and sandy gravel, and/or mixtures thereof (e.g., sandy silts and silty sands). Similar to the alluvial fan deposits, thickness of the older alluvium materials is likely to vary in the Project alignment but would extend to depths below the anticipated development associated with the proposed Project.

4.6.4.2 Seismic Setting

The tectonic setting of the Los Angeles Basin area is dominated by right-lateral strike-slip faults with a general northwest by southeast trend as a result of the interaction between the Pacific and North American lithospheric plates. Numerous faults in southern California include “active,” “potentially active,” and “inactive” faults. Division of these major groups are based on criteria by CGS for the Alquist-Priolo Earthquake Fault Zoning Program. By definition, an “active” fault is one that has had displacement within Holocene time (last 11,000 years). A “potentially active” fault has demonstrated displacement of Quaternary-age deposits (last 1.6 million years). “Inactive” faults have not exhibited displacement in the last 1.6 million years.[25]

Faults of tectonic significance mapped in the Los Angeles region and the historical earthquake epicenters in the region include the Santa Monica fault zone (SMFZ) to the north and northwest; the Newport-Inglewood fault zone (NIFZ) to the east and west; and the Cabrillo, Redondo Canyon, and Palos Verdes faults offshore to the west and southwest. Faults considered active and their respective distances from the Project and maximum moment magnitudes are presented in **Table 4.6-1: Significant Seismic Sources Near the Project.**

25 Faults are currently categorized as Holocene-active, age-undetermined, and pre-Holocene according to Earthquake Fault Zones, California Geological Survey’s Special Publication 42, Section 5, rev. 2018.

Table 4.6-1
Significant Seismic Sources Near the Project

Fault or Fault Segment	Fault Type[1]	Approximate Slip Rate (mm/yr)[2]	Dip Direction[3]	Approximate Fault Length (km)[4]	Approximate Closest Distance to Project (km)[5]	Approximate Maximum Magnitude (Mw)[6]
Newport-Inglewood (onshore)	RL	1.0	—	65	0.20	7.2
Santa Monica	O/LL, R	1.0	N	28	13	6.6
Hollywood	O/LL, R	1.0	N	17	14	6.4
Raymond	O/LL, R	1.5	N	22	21	6.8
Malibu Coast	O/LL, R	0.3	N	38	36	6.7
Palos Verdes	RL	3.0	—	99	21	7.3
Sierra Madre	R	2.0	N	57	32	7.2
Whittier	RL	2.5	NE	46	31	7.0
Elsinore	RL	5.0	V	38	65	6.8
San Andreas (Mojave section)	RL	30.0	V	99	68	7.1

Source: Geosyntec, The Inglewood Transit Connector, Technical Memorandum, Geology and Soils,2018.
Notes:
"-" Unspecified
1 - RL = Right Lateral Strike-Slip Fault; LL = Left Lateral Strike-Slip Fault; O/LL = Oblique Left-Lateral Fault; R = Reverse Fault
2 - Approximate Slip Rate millimeters per year (mm/yr) obtained from CGS (2003) and USGS (2008)
3 – N = North; S = South, V = Vertical, NE = Northeast, E = East
4 - Fault Length obtained from CGS (2003) and USGS (2008)
5 - Distances from Project noted are the closest distances to the surface trace or inferred projection of the fault as measured from the CDMG (1998), CGS (2003), or USGS (2008)
6 - Maximum Earthquake values reported at maximum moment magnitude by the CGS (2003) and USGS (2008)

4.6.4.3 Faults

Both active and potentially active faults are located in the Project area, as shown in **Figure 4.6-1: Faults within the Project Area**.

Active Faults

The faults closest to the Project area that are considered "active" include the following:

Newport Inglewood Fault Zone

The Los Angeles Basin section of the NIFZ is the closest major active fault zone to the Project, with the Inglewood and Potrero fault segments located respectively at their nearest points, approximately 0.45miles (0.75 km) east and 0.15 miles (0.25 km) west of the Project alignment. The NIFZ is composed of a series of discontinuous northwest trending en echelon faults extending from Ballona Gap southeast to the area offshore of Newport Beach.[26] This zone is reflected at the surface by a line of geomorphically young anticlinal hills and mesas formed by the folding and faulting of a thick sequence of Pleistocene-age sediments and Tertiary-age sedimentary rocks. Historical seismic activity (between 1977 and 1985) shows mostly strike-slip faulting with some reverse faulting along the northern segment (north of Dominguez Hills), and normal faulting along the southern segment (south of Dominguez Hills to Newport Beach).

Inglewood Fault

The Inglewood Fault, one local component of the Newport-Inglewood Fault Zone, is well exposed in the Baldwin Hills, where it has been mapped by the USGS.[27] North of Centinela Creek, which is northwest of the Project, the fault offsets geologic units of Pleistocene age and is marked by a westerly- facing scarp which dies out to the south with only a small break in slope extending south of Centinela Creek.[28]

There is diverse opinion as to whether the fault extends south of Centinela Creek along its established trend, or whether it is offset by the Centinela Creek Fault and becomes the Townsite Fault, which trends through portions of the Project alignment, towards the southeast and across Sofi Stadium.[29]

Potrero Fault

The Potrero Fault, a major local component of the Newport-Inglewood Fault Zone, traverses east of the Project in a northwest-southeast direction. It is well defined in the subsurface by oil well data from the Potrero oil field where it consists of a zone 100 to 200 feet wide.[30] It is known to cut Pleistocene aquifers in the Centinela Creek area where historically it was responsible for the existence of the Centinela Spring. At its intersection with the Centinela Fault, the Potrero Fault is either offset or bent so that its northern extension is displaced to the east. Along the east side of the Sofi Stadium, the fault is marked at the surface by an impressive westward-facing scarp about 50 feet high. Near its southern end, both topographic and subsurface evidence of its position disappear. The fault bends to the east and extends toward the southeast of the City.

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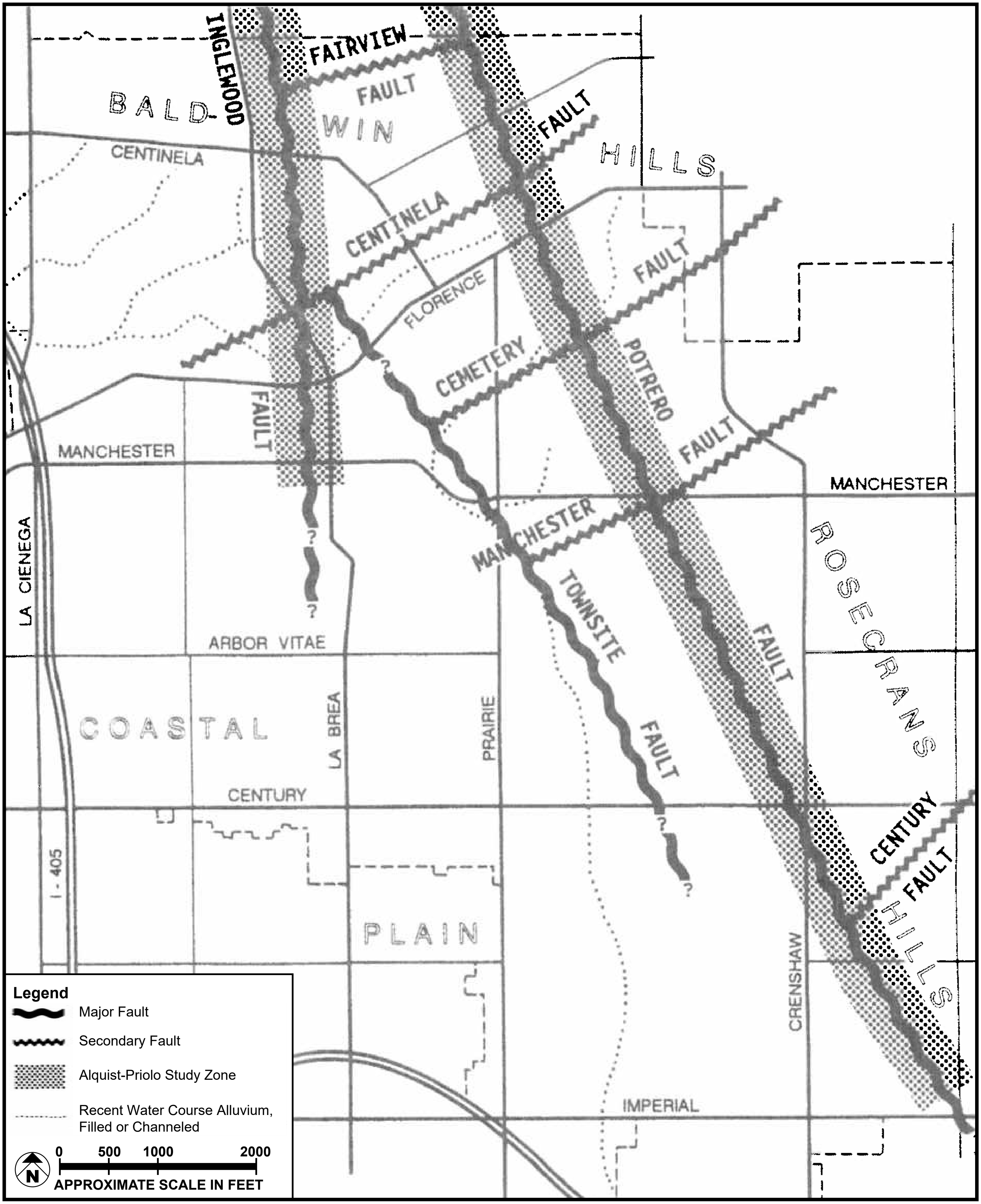
26 En echelon faults are parallel or subparallel, closely spaced, overlapping, or step-like faults that are oblique to the overall structural trend.

27 Fault Rupture Hazard Evaluation in Support of Draft EIR (Fault Rupture Hazard Evaluation), Geosyntec Consultants, September 27, 2019.

28 City of Inglewood, General Plan, Safety Element, July 1995.

29 Fault Rupture Hazard Evaluation in Support of Draft EIR (Fault Rupture Hazard Evaluation), Geosyntec Consultants, September 27, 2019.

30 City of Inglewood, *General Plan, Safety Element*, July 1995.



SOURCE: City of Inglewood General Plan Safety Element; Meridian Consultants LLC - 2020

FIGURE **4.6-1**

Faults within the Project Area

251-003-20

Santa Monica Fault Zone

The SMFZ is considered a continuous zone comprised of five fault segments including the Malibu Coast, Santa Monica, Hollywood, and Raymond faults, with a total length of approximately 150 miles. The SMFZ exhibits both reverse and left-lateral components of slip and is located approximately 7 miles (12 km) northwest of the Project alignment at its nearest points. The SMFZ extends 25 miles from the western edge of Beverly Hills across West Los Angeles and Santa Monica to Pacific Palisades, where it trends offshore and parallels the Malibu coast near Point Dume. The SMFZ extends eastward as the Hollywood fault 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 active Hollywood fault trends east-west along the southern boundary of the Santa Monica Mountains, located approximately 8.5 miles (13.5 km) north of the proposed Project.

San Andreas Fault Zone

The San Andreas strike-slip fault is located approximately 40 miles (65 km) to the northeast, along the northern edge of the San Gabriel Mountains at their contact with the Mojave Desert. The approximately 700-mile-long San Andreas Fault is a network of faults that collectively accommodates the majority of relative north-south motion between the North American and Pacific tectonic plates. The most recent movement on the fault is estimated to be Latest Quaternary (less than 15,000 years before present) with a slip rate of 30 millimeters per year (mm/yr) and a 100-135-year recurrence rate.

Elsinore Fault Zone

The Whittier section of the right-lateral Elsinore fault zone is approximately 17 miles (27 km) to the east of the Project. The most recent movement in the fault zone is estimated to be within late Quaternary (less than 15,000 years before present) with a slip rate of 2.5 mm/yr.

Blind Thrust Faults

Blind thrust fault zones are considered active features that do not rupture at the ground surface. Although these features present risk by generating intense seismic shaking, their respective distances to the proposed Project are not included in **Table 4.6-1** due to the uncertainty in their vertical surface projection. Known blind thrust faults within the Project vicinity along with their respective slip rates and maximum moment magnitudes are described below.

Elysian Park Thrust

The Elysian Park Thrust, previously defined as the Elysian Park Fold and Thrust Belt, is a blind thrust fault that overlies the Los Angeles and Santa Fe Springs segments of the Puente Hills Thrust. The eastern edge of the Elysian Park Thrust is defined by the northwest-trending Whittier fault zone. The closest edge of the vertical surface projection of the Elysian Park Thrust is approximately 6 miles (10 km) northeast of the proposed Project. Like other blind thrust faults in the Los Angeles area, the Elysian Park Thrust is not exposed at the surface and does not present a potential surface rupture hazard; however, should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.3 mm/yr and a maximum moment magnitude (M, defined as a measurement of the size of an earthquake in terms of energy released) of 6.4 were estimated for the Elysian Park Thrust.

Compton-Los Alamitos Thrust

The Compton-Los Alamitos Thrust is an inferred blind thrust fault located within the south-central portion of the Los Angeles Basin. The closest edge of the vertical surface projection of the buried thrust fault is located approximately 8 miles (13 km) southwest of the Project alignment. Like other blind thrust faults in the Los Angeles Area, the Compton-Los Alamitos Thrust is not exposed at the surface and does not present a potential surface rupture hazard; however, should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.5 mm/yr and a maximum moment magnitude M 6.8 were estimated for the Compton-Los Alamitos Thrust.

Puente Hills Blind Thrust

The Puente Hills Blind Thrust fault (PHBT) system extends eastward from downtown Los Angeles to Brea in northern Orange County. The PHBT is comprised of three north-dipping segments overlain by folds expressed at the surface as the Coyote Hills, Santa Fe Springs Anticline, and the Montebello Hills. The PHBT exhibits an estimated average slip rate of 0.7 mm/year. Postulated earthquake scenarios for the PHBT include a single segment rupture of a magnitude M 6.6, and a multiple segment rupture producing an earthquake of M 7.1. The PHBT is not exposed at the ground surface and does not present a potential for surface fault rupture. However, based on deformation of late Quaternary age sediments above this fault system and the occurrence of the Whittier Narrows earthquake, the PHBT is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin.

Potentially Active Faults

Faults considered “potentially active” located close to the Project alignment include the following:

Overland Fault

The Overland fault located approximately 1.3 miles (2 km) southwest of the Project alignment is considered potentially active. The Overland fault trends northwest between the Charnock fault and the Newport-Inglewood fault zone, extending from the northwest flank of the Baldwin Hills to Santa Monica Boulevard in the vicinity of Overland Avenue. However, there is no evidence that the fault has offset late Pleistocene or Holocene age alluvial deposits and is considered potentially active by the State Geologist.

Charnock Fault

The potentially active Charnock fault is located approximately 3.8 miles (6 km) southwest of the Project alignment. The Charnock fault trends northwest-southeast subparallel to the Newport-Inglewood fault zone and the Overland fault. No recent evidence suggests the fault has offset late Pleistocene or Holocene age alluvial deposits and is considered potentially active by the State Geologist.

Townsite Fault

The Townsite fault extends from its intersection with the Centinela Fault in the Centinela Creek, towards the southeast—likely across the Sofi Stadium—to Century Boulevard. Nearby improvements weave around the Townsite fault. The Townsite fault does not lie within the boundaries of an “Earthquake Fault Zone” as defined by the State of California in the Alquist-Priolo Earthquake Zoning Act. However, its location within the active NIFZ suggests it should be considered active with the potential for surface fault rupture.

Transverse Faults

Five generally east-west trending faults intersect the major general north-south trending faults (Inglewood, Townsite, and Potrero): Fairview, Centinela, Manchester Boulevard, Inglewood Park Cemetery, and Century Faults. Little geologic data have been published on these faults. They have been mapped on the basis of topographic expression and some studies. As shown in **Figure 4.6-1**, the Centinela Creek fault, Inglewood Park Cemetery fault, and Manchester Boulevard fault are perpendicular to the Townsite fault and in close proximity to the Project.

Surface Fault Rupture

Surface rupture or displacement occurs as a fault breaks the ground surface during a seismic event. Generally, this hazard is anticipated to occur along pre-existing faults. There has been no history of any major surface rupture on any of these fault zones.[31]

Fault rupture hazard is evaluated to assess the exposure of people or structures to substantial adverse effects, including the risk of loss, injury, or death. The potential for fault surface rupture is generally considered to be significant along “active” faults and to a lesser degree along “potentially active” faults.

The proposed Project does not lie within the boundaries of an Earthquake Fault Zone as defined previously. The closest Alquist-Priolo Zone to the proposed Project has been established for two portions of the Newport-Inglewood fault zone located approximately 280-feet west of the alignment along North Market

31 City of Inglewood *Technical Background Report*, August 2006.

Street (Inglewood fault), and approximately 2,750-feet east of the alignment from the intersection of West Manchester Boulevard and Prairie Avenue (Potrero fault).

4.6.4.4 Ground Shaking

Most of Southern California is characterized by seismic activity and is subject to some level of ground shaking as a result of movement along the major active (and potentially active) fault zones that are located in the region. Additionally, as a result of the existing faults within the City and the region, the Project area is seismically active. Ground shaking is a major cause of structural damage from earthquakes. The amount of motion expected at a building or structure site can vary from none to forceful depending upon the distance to the fault, the magnitude of the earthquake, and the local geology. Greater movement can be expected at sites located on poorly consolidated material such as alluvium located near the source of the earthquake epicenter or in response to an earthquake of great magnitude.

The City is underlain by two different types of alluvium soils, undifferentiated late Pleistocene alluvium (Qoa) that is composed of well consolidated and cemented gravel, sand, silt, and clay; and late Holocene alluvium (Qya2) that is composed of unconsolidated and uncemented gravel, sand, silt, and clay. Both of these soil types generally provide poor resistance to ground shaking.[32]

The Project alignment is situated within a seismically active region and would likely experience moderate to severe ground shaking in response to a large-magnitude earthquake occurring on a local or more distant active fault during the expected lifespan of the Project. The potential for significant seismically induced ground shaking in response to an earthquake occurring along a nearby active fault is relatively high within the vicinity of the proposed Project.

4.6.4.5 Paleontological Resources

The geologic units present in the Project area are older quaternary alluvium (Qoa), deposited from erosion of the surrounding highlands. Qoa are considered to have a high paleontological sensitivity. They are old enough to preserve fossil resources (i.e., over 5,000 years, as per the SVP) and have a rich fossil history in Los Angeles and throughout southern California. A wide variety of Ice Age fossils are known from these sediments across the Los Angeles Basin including multiple specimens belonging to ten taxa known from within two to four miles of the proposed Project vicinity.[33]

Additionally, according to the Natural History Museum of Los Angeles County, the closest locality known from Qoa sediments is approximately 2.0 miles west of the Project, where a fossil mammoth

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32 City of Inglewood *General Plan*, "Safety Element" (1995).

33 Paleontological Resources Assessment Report, Inglewood Basketball and Entertainment Center, City of Inglewood, California, ESA, May 2019

(*Mammuthus*) was recovered 40 feet bgs. North of that locality, specimens of mammoth, rodent (*Rodentia*), and a speckled sanddab (*Citharichthys stigmaeus*) were collected from 14 feet bgs. Near the intersection of Airport Boulevard and Manchester Boulevard, fossil specimens of horse (*Equus*), mammoth , bison (*Bison*), and rabbit (*Lepus*) were collected from 13 – 16 feet bgs. Farther west, near the Los Angeles International Airport, a fossil elephant (*Proboscidea*) was collected from 25 feet bgs.[34]

4.6.4.6 Adjusted Baseline

This section assumes the Adjusted Baseline Environmental Setting as described in **Section 4.0: Environmental Impact Analysis**, *4.0.4: Adjusted Baseline*. Related to seismicity and paleontological resources, the changes associated with the Adjusted Baseline projects include excavation and construction activities within the HPSP area.

There is no evidence that development in the HPSP would affect the baseline for analysis of geology and soils. No new impacts to geology and soils have been discovered or documented during construction of the Adjusted Baseline projects that would provide additional information on the presence or sensitivity of geology and soils impacts in the area.

4.6.5 THRESHOLDS OF SIGNIFICANCE

Criteria outlined in CEQA Guidelines were used to determine the level of impacts to geology and soils. As discussed in *Section 4.6.1*, six screening thresholds related to geology and soils of Appendix G of CEQA Guidelines were eliminated from further analysis in this EIR. The below three were identified in the Initial Study as having a potentially significant impact in relation to geology and soils if the Project were to:

Threshold GEO-1: **Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving 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.**

Threshold GEO-2: **Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.**

Threshold GEO-3: **Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.**

34 Paleontological Resources Assessment Report, Inglewood Basketball and Entertainment Center, City of Inglewood, California, ESA, May 2019

4.6.6 IMPACT ANALYSIS FOR THE PROPOSED PROJECT

Impact GEO-1: **Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving 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?**

The State of California, under the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act, classifies faults as active, potentially active, and not active. The Alquist-Priolo Earthquake Fault Zoning Act requires that geologic investigations be prepared for development sites within Earthquake Fault Zones (APEFZ) to demonstrate that the sites are not threatened by surface rupture from future faulting. In addition, if an active fault is found, all structures for human occupancy must be set back a minimum of 50 feet, or a distance demonstrated to be appropriate by the geologic investigation, from the fault.

The Project area does not lie within the boundaries of an APEFZ. The nearest APEFZs to the Project are two segments of the Newport-Inglewood fault zone located approximately 280 feet west of the alignment along Market Street (the Inglewood Fault), and approximately 2,750-feet east of the Project from the intersection of Manchester Boulevard and Prairie Avenue (the Potrero Fault). Furthermore, previous fault investigations completed west of Market Street did not reveal evidence of faulting or surface rupture (see **Appendix K.1**). Therefore, impacts resulting from the Inglewood and Potrero faults would be less than significant.

The Project, however, is close to several potentially active faults, including the Townsite Fault, Centinela Creek Fault, Inglewood Park Cemetery Fault, and Manchester Fault. The Townsite Fault, in particular, may traverse the Project alignment. As described previously in *Section 4.6.4.3* and shown in **Figure 4.6-2: Location of Active Faults and the Project**, the Townsite Fault may intersect the Project alignment at various points.

- A segment of the guideway within the parking lot near the Market Street/Florence Avenue Station appears to cross the Townsite Fault, and
- A segment of the guideway on Manchester Boulevard, near the proposed Maintenance and Storage Facility (MSF) may cross the Townsite Fault.

Also as noted in **Figure 4.6-2:**

- The Manchester Fault may intersect the guideway on Prairie Avenue near Pincay Drive, perpendicular to the Townsite Fault,

- The Market Street/Florence Avenue station is approximately 830 feet south of the Centinela Creek Fault, and
- Segments of the guideway on Market Street and Manchester Boulevard are as close as approximately 525 feet southwest of the Inglewood Park Cemetery Fault.

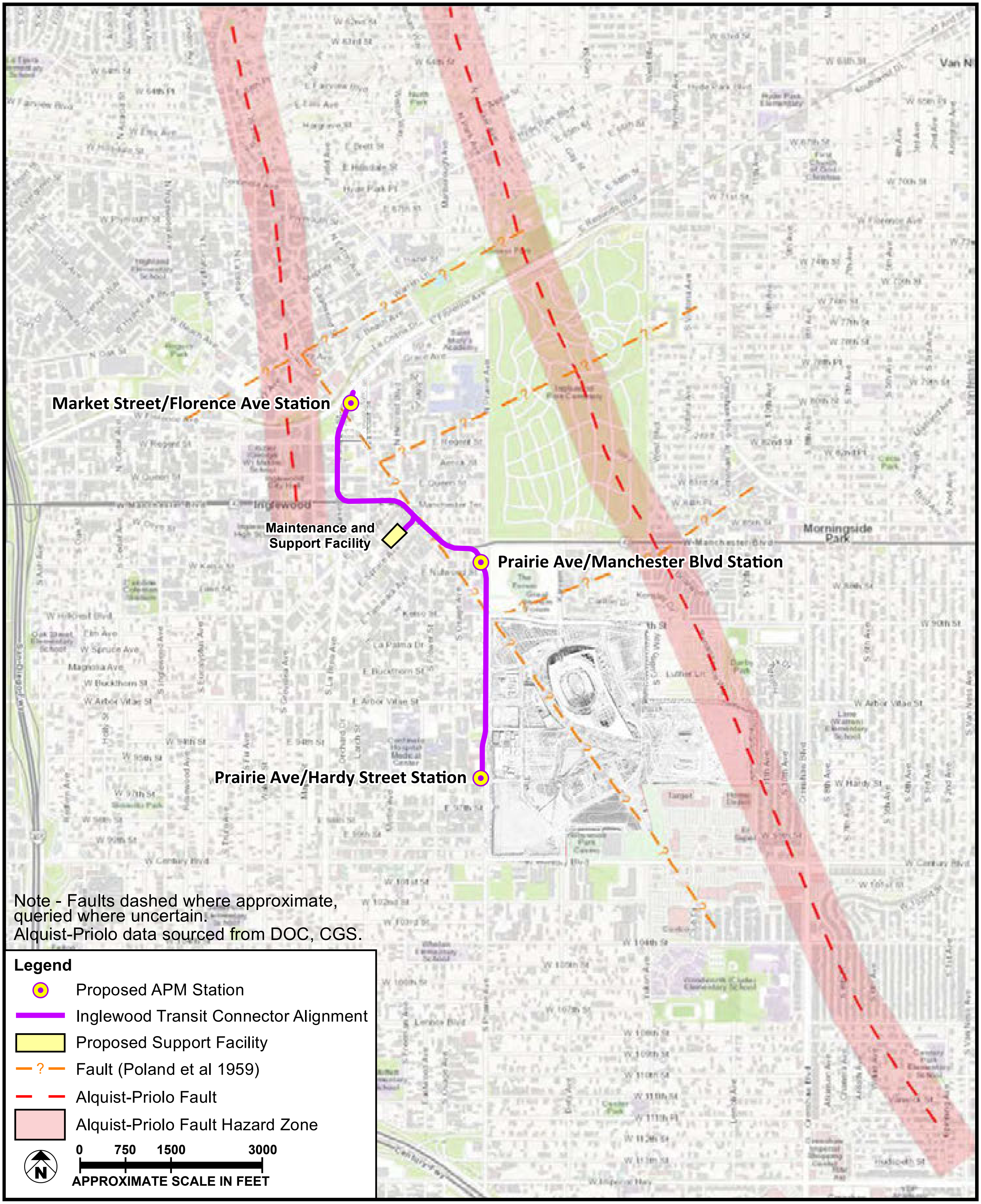
Although the Townsite, Centinela Creek, Inglewood Park Cemetery, and Manchester faults are not APEFZ faults, their locations near the Inglewood Fault and Potrero Fault, which are active and local components of the Newport-Inglewood Fault Zone, suggest that these faults should be considered active with the potential for fault rupture.[35] As a result of the proposed improvements potentially overlying the Townsite Fault, fault rupture impacts would be potentially significant.

Prior to the start of construction, the anticipated trend of the Townsite fault would be further investigated to identify and locate active fault traces in the Project area and to allow for adjustments to the placement of proposed structures. Additionally, the design of the structures would comply with the provisions of the California Building Code, which would address the potential effects of fault ruptures. Elevated structures that may cross a fault segment, including the guideway and elevated passenger walkways would be designed in conformance with Caltrans MTD 20-8 and 20-10 as discussed above in *Section 4.6.3.2*. Consistent with Caltrans MTD 20-8 and 20-10, columns and abutments, as well as other structural components will be located to avoid or minimize fault rupture zones or designed to take into account potential displacement from a fault offset, dynamic response due to ground shaking, and any other fault-induced hazards, such as creep. Designing the Project in conformance with the latest CBC[36], Caltrans guidance, and applicable seismic design criteria as would be required by **Mitigation Measures (MM) GEO-1** through **MM GEO-3** would reduce potential impacts to less than significant.

Summary

The City contains both active and potentially active faults, which may traverse the Project alignment. The Project does not lie within the boundaries of APEFZ as defined by the State of California in the Alquist-Priolo Earthquake Zoning Act. However, the Project alignment is proximate to a number of potentially active faults, including the Townsite fault, Centinela Creek Fault, Inglewood Park Cemetery Fault, and Manchester Fault.

35 Geosyntec. Fault Rupture Hazard Evaluation in Support of Draft EIR. September 2019.
36 2019 California Building Standards Code (Cal. Code Regs., Title 24) published July 1, 2019.



SOURCE: Geosyntec Consultants - September 2019; Meridian Consultants LLC - 2021

FIGURE **4.6-2**

Location of Active Faults and the Project

251-003-20

Although these faults are not mapped as APEFZ faults, or situated within a delineated APEFZ, their locations within the active Newport-Inglewood fault zone suggests that they be considered active with the potential for fault rupture. In particular, the Townsite Fault may intersect the Project alignment and cause surface rupture. Therefore, impacts would be potentially significant. Further investigation of the anticipated trend of the Townsite fault, placement of structures away from faults, and designing the Project in conformance with the latest CBC,[37] Caltrans guidance, and applicable seismic design criteria as would be required by **MM GEO-1** through **MM GEO-3** would reduce potential fault rupture impacts to less than significant.

4.6.6.1 Mitigation Measures

The following Mitigation Measures (MMs) are identified to reduce potential impacts related to fault rupture and seismic shaking to less than significant:

MM GEO-1: **Project Design.** The proposed Project shall be designed to accommodate fault rupture where present in accordance with applicable Caltrans guidelines, including MTD 20-8, *Analysis of Ordinary Bridges that Cross Faults*, dated January 2013; and MTD 20-10, *Fault Rupture*, dated January 2013, where any portion of a structure falls within an APEFZ, or where any portion of a structure falls within approximately 100 meters (330 feet) of well-mapped active faults, or within 300 meters (1,000 feet) of an un-zoned fault (not in an APEFZ) that is Holocene or younger in age.

Stations and elevated structures for the Automated Transit System (ATS) guideway shall be located to avoid the fault rupture hazard where present with refinement of station and ATS guideway placement worked into final design as needed. Bridge type structures, such as the ATS guideway, shall be designed to take into account potential displacement from a fault offset, dynamic response due to ground shaking, and any other fault-induced hazards (e.g., creep) that may occur. The design shall be in accordance with the Caltrans MTD 20-8, which defines a method for determining the potential displacement at columns and abutments at fault crossings and designing the structure so it can slide without falling.

MM GEO-2: Prior to the start of construction, the location of the anticipated trend of the Townsite Fault shall be further defined via a phased investigation process to identify and locate active fault traces in the Project area to support adjustments to the Project's final design as needed.

The phased investigation shall be prepared by registered professionals (i.e., California Professional Civil Engineer, Professional Engineering Geologist with experience in fault evaluations) and include a fault investigation conducted along the trace of the Townsite

37 2019 California Building Standards Code (Cal. Code Regs., Title 24) published July 1, 2019.

Fault to refine its location and assess its activity level where it crosses the ATS guideway and stations.

The following methods shall be included in the investigation:

- Aerial photograph analysis;
- Geophysical surveys (e.g., seismic reflection and/or seismic refraction) to refine the location of the Townsite fault and inform subsequent targeted fault hazard exploration as necessary;
- Targeted fault trenching based on the findings of additional geophysical studies to locate the potential Townsite Fault where it crosses the proposed ATS alignment; and
- Exploratory drilling and sampling (e.g., hollow stem auger and CPT [cone penetration test] borings), as necessary, if the trace of the Townsite fault cannot be adequately delineated across the proposed ATS alignment through the means of fault trenching.

Based on the results of these investigations, column placements and facility designs shall be adjusted to accommodate geologic conditions identified. Further, the facilities shall be designed in accordance with applicable Caltrans guidelines including MTD 20-8, *Analysis of Ordinary Bridges that Cross Faults*, and MTD 20-10, *Fault Rupture*. Stations/structures shall be located to avoid the fault rupture hazard where present.

Columns and foundations for the guideway and stations, as well as any other ATS facilities shall be located to avoid the fault rupture hazard where present.

Probabilistic procedures shall follow those outlined in the *Fault Rupture Hazard Evaluation* (**Appendix K.1**). If further study of the fault rupture is conducted, then procedures as outlined in CGS Note 49[38] shall be followed.

MM GEO-3: The proposed ATS system facilities shall be designed in accordance with applicable Caltrans guidelines including Memo to Designers 20-8 (Analysis of Ordinary Bridges that Cross Faults) and 20-10 (Fault Rupture). The response spectra provided in the *Development of Seismic Design Criteria in Support of Draft EIR - Seismic Design Criteria* (**Appendix K.2**) shall be considered applicable for both aerial guideway and ancillary structures within each segment of the alignment under the guideway and each station.

Probabilistic procedures also shall follow those outlined Caltrans Memo to Designers 20-10 -Fault Rupture, dated January 2013.

38 California Geological Survey, Note 49: Guidelines for Evaluating the Hazard of Surface Fault Rupture, https://www.conservation.ca.gov/cgs/Documents/Publications/CGS-Notes/CGS-Note-49.pdf.

4.6.6.2 Level of Significance After Mitigation

Implementation of **MM-GEO-1** would prevent impacts by locating structural improvements to avoid faults where feasible and designing the guideway, columns, and elevated passenger walkways to account for the effects that may result from fault displacement. With implementation of **MM GEO-2**, the trend of the Townsite Fault would be determined through an investigation prior to final design of the Project with the findings dictating the placement of structural improvements to ensure impacts related to fault rupture would be minimized or avoided. Implementation of **MM GEO-3** would ensure that the design of the proposed improvements adhere to specific seismic and structural design criteria. As such, significant impacts and hazards regarding fault rupture and seismic ground shaking would be reduced to a level that is less than significant.

Impact GEO-2: **Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?**

Ground shaking is a major cause of structural damage from earthquakes. The amount of motion expected at a building or structure can vary from none to forceful depending upon the distance to the fault, the magnitude of the earthquake, and the local geology. Greater movement can be expected at sites located on poorly consolidated material such as alluvium located near the source of the earthquake epicenter or in response to an earthquake of great magnitude.

The proposed Project is situated in a seismically active region and will likely experience moderate to severe ground shaking in response to a large-magnitude earthquake occurring on a local or more distant active fault during the expected lifespan of the Project. The potential for significant seismically induced ground shaking in response to an earthquake occurring along a nearby active fault, such as the Newport-Inglewood fault zone, or a regional fault, such as the San Andreas fault zone, is relatively high within the vicinity of the proposed Project.

The Project is located within a surface geologic unit designated as “older alluvium (Qoa),” which is described as stiff to hard clay and medium dense to very dense sand, silty sand, clayey sand, and silt. This soil type generally provides poor resistance to ground shaking. Due to the proximity of the Project to nearby faults and the geologic unit, the possibility for extreme seismic shaking within the Project area is potentially significant.

The Development of Seismic Design Criteria in Support of Draft EIR - Seismic Design Criteria (**Appendix K.2**) show the distribution of the mean of the time-averaged shear wave velocity within the upper 30 meters (Vs30_mean) in the soils in the areas surrounding the ITC are generally considered to be “very dense soil and soft rock," which is consistent with generally poor resistance to groundshaking as described previously. The various components of the proposed Project would be susceptible to the effect of ground shaking from seismic activity.

Aerial Guideways, Elevated Passenger Walkways, and Stations

Other public agencies, including Caltrans and Metro, have determined that when structures such as those proposed for the guideway and stations are designed, the designs should meet the requirements for "bridges and aerial guideways, the design shall not result in less seismic performance capability than that required by Caltrans." As such, ground motions developed for the proposed Project in accordance with the maximum design event (MDE) level should be compared to the Caltrans design spectrum[39] and the more critical design load should govern.

Ancillary Surface Facilities

Portions of the proposed Project, including the PDS substations, would be subject to review by City building officials. Ground motions developed for the Project in accordance with the MDE level should be compared to the 2019 CBC,[40] and the more critical design load should govern. In the case where commercial/residential structures are unrelated to or not connected to the Project or support buildings directly, the use of 2019 CBC[41] design response spectra may be an appropriate basis for design at the discretion of the design engineer. Again, agencies responsible for the construction and operation of transportation facilities such as Caltrans and Metro have determined that to reduce the effects of extreme seismic shaking, ancillary surface facilities, such as the planned PDS substations, may be subject to both the code forces normally applied to surface buildings as well as those being applied to the transit guideways and above ground structures. Whichever code applies the most critical set of requirements shall apply.[42]

Summary

The proposed Project is located within a surface geologic unit designated as "older alluvium (Qoa)" and would be susceptible to the effect of ground shaking from seismic activity. Ground shaking impact resulting in loss, injury, and death would be potentially significant. Furthermore, all Project improvements would be susceptible to structural damage from extreme ground shaking events, and the interruption to service or backup power could occur, resulting in a potentially significant impact for loss, injury, or death.

40 2019 California Building Standards Code (Cal. Code Regs., Title 24, Part 2, Volumes I and II) published July 1, 2019.
40 2019 California Building Standards Code (Cal. Code Regs., Title 24, Part 2, Volumes I and II) published July 1, 2019.
41 2019 California Building Standards Code (Cal. Code Regs., Title 24, Part 2, Volumes I and II) published July 1, 2019.
42 2019 California Building Standards Code (Cal. Code Regs., Title 24) published July 1, 2019.

4.6.6.3 Mitigation Measures

MM GEO-1 through **MM GEO-3** shall be implemented to reduce potentially significant impacts related to seismic ground shaking to less than significant.

4.6.6.4 Level of Significance After Mitigation

Implementation of **MM GEO-1** through **MM GEO-3** would reduce seismic related impacts to less than significant.

Impact GEO-3: Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

A direct effect on a unique paleontological resource would result in the direct damage or destruction of such a resource. Indirect impacts are not specifically caused by a development project but may be a reasonably foreseeable result of such a project. Typical indirect impacts to paleontological resources include the destruction or loss of surface fossils from increased erosion or the non-scientific or unauthorized surface collection or subsurface excavation of a fossil or paleontological site.

The Project area is underlain by artificial fill materials, as shallow as two feet bgs before alluvial soils are encountered. The subsurface sediments in the Project area are identified as Qoa and are assigned high paleontological sensitivity,[43] as there is a proven record throughout Los Angeles of containing scientifically significant fossils in this formation. Although no known resources were identified within the Project vicinity from the Natural History Museum, this does not preclude the possibility that previously unknown buried paleontological resources could be impacted during Project construction. Excavation during construction could encounter Qoa determined to have a high sensitivity for fossils, and the proposed Project would have the potential to directly and/or indirectly destroy a previously unknown unique paleontological resource.

Implementation of **MM GEO-4** would require that prior to the City's approval of grading permits, a paleontologist meeting the SVP Standards be retained to prepare, design, and implement a paleontology monitoring and mitigation program for the Project consistent with SVP Guidelines. This monitoring and mitigation program would include education and sensitivity training for construction workers, guidelines for on-site paleontological monitors to issue stop-work orders if fossils are found, procedures for paleontological resource evaluation in the event of discovery, and final reporting procedure guidelines for

43 Paleontological Resources Assessment Report, Inglewood Basketball and Entertainment Center, City of Inglewood, California, ESA, May 2019.

submission to the City. With implementation of **MM GEO-4**, potentially significant impacts related to paleontological resources would be reduced to less than significant.

4.6.6.5 Mitigation Measures

The following mitigation measure will reduce potentially significant impacts to paleontological resources to less than significant:

MM GEO-4: A qualified paleontologist meeting the SVP standards shall be retained by the project applicant and approved by the City prior to the approval of grading permits. The qualified paleontologist shall:

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

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

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

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

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

4.6.6.6 Level of Significance after Mitigation

Implementation of **MM GEO-4** would ensure that paleontological resources would be identified before they are damaged or destroyed and are properly evaluated and treated to reduce potentially significant impacts to less than significant.

4.6.7 CUMULATIVE IMPACTS

Geotechnical impacts related to developments in the City would involve hazards related to site-specific soil conditions, erosion, and ground-shaking during earthquakes. These impacts would be site-specific and would not be common to (nor shared with, in an additive sense) the impacts on other sites. Cumulative development in the area would increase the overall population for exposure to seismic hazards by increasing the number of people potentially exposed. However, with adherence to **MM GEO-1** through **MM GEO-3**, applicable State, and federal regulations, building codes and sound engineering practices, geologic hazards could be reduced to less-than-significant levels. Furthermore, development of each of the related projects and the proposed Project would be subject to existing building codes, uniform site development and construction review standards that are designed to protect public safety. Therefore, cumulative geotechnical impacts would not be cumulatively considerable.

Impacts to paleontological resources related to future development in the region could involve the demolition or destruction of significant paleontological resources. The proposed Project could contribute to this impact if paleontological resources are located beneath the Project area and are damaged or destroyed during the excavation process. In such an event, the proposed Project contribution to the significant cumulative impact would be cumulatively considerable, and impacts would be potentially significant. Implementation of **MM GEO-4** would lessen the Project's contribution to the loss of paleontological resources by requiring that work stop of such resources are discovered, until the resources can be evaluated, collected, properly treated, and curated with accredited repository with retrievable storage. With implementation of this mitigation measure, the Project's contribution to the cumulative loss of paleontological resources would be less than cumulatively considerable.

4.6.8 CONSISTENCY WITH CITY OF INGLEWOOD GENERAL PLAN

4.6.8.1 Safety Element

Table 4.6-2: Project Consistency with General Plan Safety Element below lists the policy and measures from the City's General Plan Safety Element applicable to the proposed Project:

Table 4.6-2
Project Consistency with General Plan Safety Element

Policies and Measures	Plan Consistency
Policy 1: Provide Measures to reduce seismic impacts.	**Consistent with Mitigation.** The proposed Project is located is a seismically active area. As such, the Project including the guideway, stations, MSF, and elevated passenger walkways, and other support facilities would be subject to seismic shaking. The replacement Vons store, which would be developed prior to proposed Project construction, would also be subject to seismic shaking. The Recirculated Draft EIR identified Mitigation Measures **MM GEO-1**, **MM GEO-2,** and **MM GEO-3** to avoid fault rupture from seismic activity and to reduce the effects of seismic shaking on built structures. Implementation of **MM GEO-1** would dictate the location of the ATS system where it crosses the known active and potentially active faults to prevent failure from fault rupture and would be consistent with Caltrans Memo to Designers 20-8 and 20-10. With implementation of **MM GEO-2**, the trend of the Townsite Fault would be specified through an investigation prior to Project construction; findings would dictate the placement of proposed structural improvements to ensure that impacts related to fault rupture would be minimized or avoided. Implementation of **MM GEO-3** would ensure that the design of the proposed improvements adhere to conservative specific seismic design criteria. The Project's compliance with the latest CBC and Caltrans advisory design measures would reduce potential impacts related to seismic ground shaking to a less-than-significant-level. In addition, the proposed Project would be consistent with Caltrans requirements pertaining to aerial guideways, bridges, and ancillary surface facilities. Further compliance with the requirements of the 2019 CBC, City municipal code, and Caltrans for structural safety would reduce hazards from strong seismic ground shaking to a less-than-significant-level.
Restrict new structures for human occupancy from being constructed across active faults.	**Consistent with Mitigation.** The proposed Project may cross potentially active faults (Townsite Fault). To assure compliance with this policy the Recirculated Draft EIR identified mitigation measure: **MM GEO-2.**

Policies and Measures	Plan Consistency
	This measure is directed towards the City and would not apply to the proposed Project, as it is a transportation project with no residential component. Implementation of **MM GEO-2** would dictate the location of structural improvements that cross the fault segments to prevent failure from potential fault rupture and would be consistent with Caltrans Memo to Designers 20-8 and 20-10. Implementation of **MM GEO-1**, the trend of the Townsite fault would be specified through an investigation prior to Project construction; findings would dictate placement of structural improvements to ensure that impacts related to fault rupture would be minimized or avoided.
Require geological and soils engineering investigations in high risk fault areas.	**Consistent with Mitigation.** The proposed Project crosses potentially active faults (Townsite Fault). To assure compliance with this policy the Recirculated Draft EIR identified mitigation measure: **MM GEO-2.** Implementation of **MM GEO-2** would require the performance a geotechnical investigation prior to Project construction to evaluate localized geological and soils conditions, such as the approximate trend of the Townsite Fault.
Use the latest State-approved edition of the Uniform Building Code and other applicable seismic design information	**Consistent.** The Project's compliance with 2019 CBC and Caltrans advisory design measures would reduce potential impacts related to seismic ground shaking to a less-than-significant-level. In addition, the proposed Project would be consistent with Caltrans requirements pertaining to aerial guideways, bridges, and ancillary surface facilities. Because the Project alignment is in a seismically active region, some risk related to seismic ground shaking would remain, even with compliance with all applicable regulatory standards and design guidelines. The proposed Project would comply with the requirements of the Municipal Code Chapter 11, Article 2 Building Code, which has adopted the has incorporated the most up to date California Building Code.
Require a soils report for new buildings, as well as obtaining or utilizing, when available, geologic drillings or studies, local ground subsidence and elevation studies, geologic-seismic studies, strong motion monitoring, gathering, compiling, and interpreting local and regional geologic seismic data as it becomes available.	**Consistent.** The proposed Project would be subject to review the design by the City and subject to the requirements of the Municipal Code Chapter 11, Article 2 Building Code, which has adopted the has incorporated the most up to date California Building Code.